Industrial Arts and Vocational Education

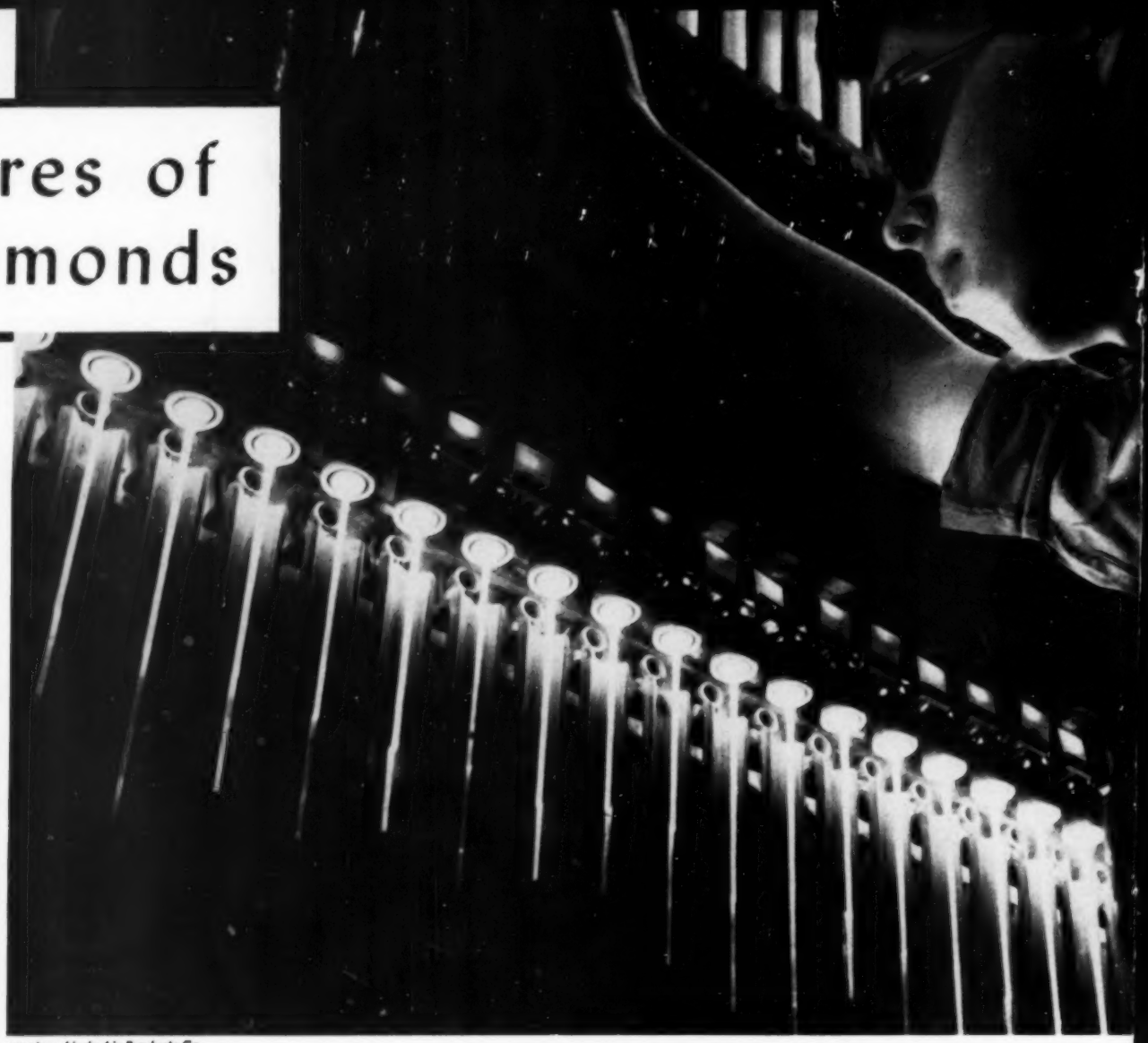
The SHOP TEACHERS' PROFESSIONAL MAGAZINE

March, 1953

Price, $1.00

SCHOOL SHOP ANNUAL

Acres of Diamonds



Eisendrath photo, courtesy Linde Air Products Co.

Years ago, Russell Conwell wrote a story about a man who hunted the wide world over for riches. After he returned, broken and defeated to die, acres of diamonds were discovered in his own backyard.

The story was so popular because it is so true. The source of any wealth, material or spiritual, is at home—in a man's mind. For example, Linde Air Products Company is "growing" sapphires and rubies finer than those found in the East . . . in its own "backyard," in a hot retort process discovered by mind power.

And to get this truth across to youngsters is the real burden of education . . . to show each individual youngster that in the depths of him lie the answer to all of his and the world's problems. Thus the educational process becomes less and less a passive reception of facts imparted by the teacher and more and more an encouragement of creative activity on the part of the student.

That is why mechanical drawing under the guidance of a good teacher is a "natural" in the establishment of this process. Here the native energy each lad possesses is channelized, his efforts disciplined and specifically adapted to the achievement of goals not different from those of manhood. Mechanical drawing leads directly to engineering and architecture, to the fundamental skills, standards, and habit of judging well of vital use in later life. It gives proof positive by focusing a boy's attention on his inner, creative powers.

Interest here aroused must be made to burst into flame that burns the brighter for each step of progress. Nothing must be permitted to dampen this ardor, no breath of inconsistency, no intimation that anything connected with the work is unimportant. To allow his students to work with drafting instruments of inferior quality, flimsy workmanship, tools bought solely because they are "cheap" is a contradiction of aim a conscientious instructor will not permit. He knows the tremendous power of suggestion fine quality and a good name possess.

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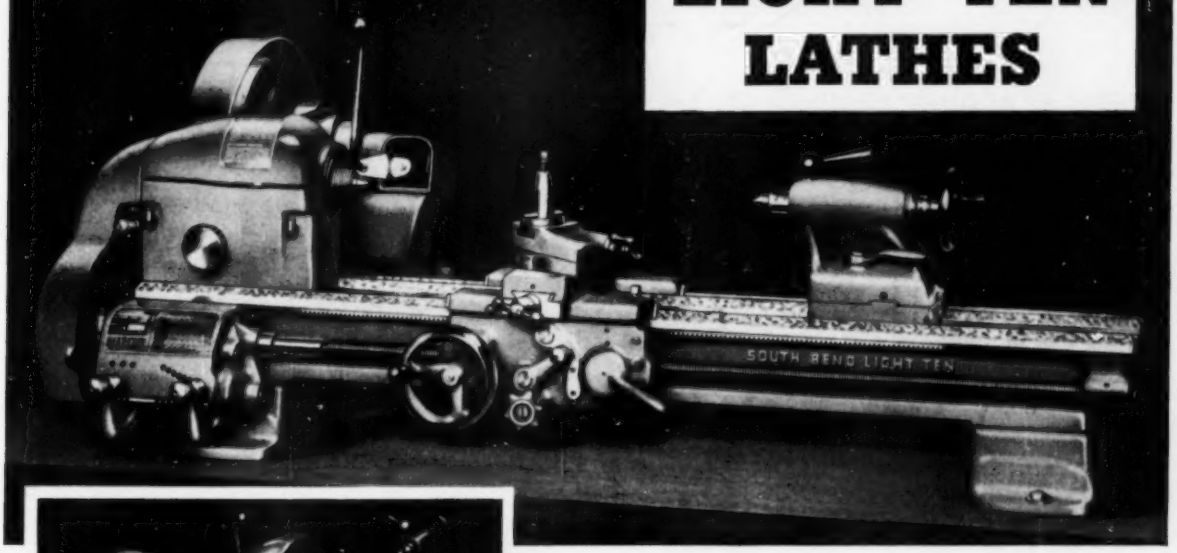
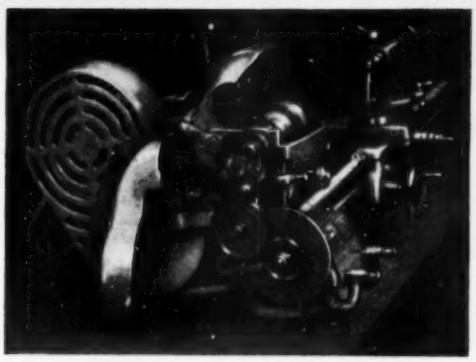
South Bend LIGHT TEN LATHES



Light Ten Model A Bench Lathe — 10" x 3-1/2'



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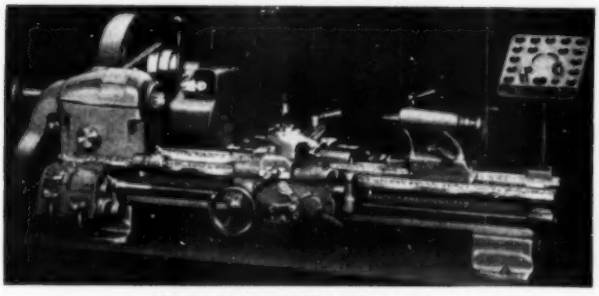

Light Ten Toolroom Lathe — 10" x 3-1/2'

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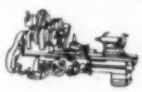
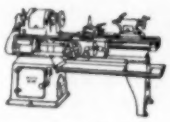
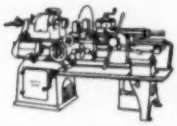
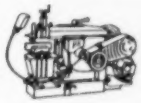

☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES


☐ 1/2" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES


☐ 7" BENCH SHAPERS

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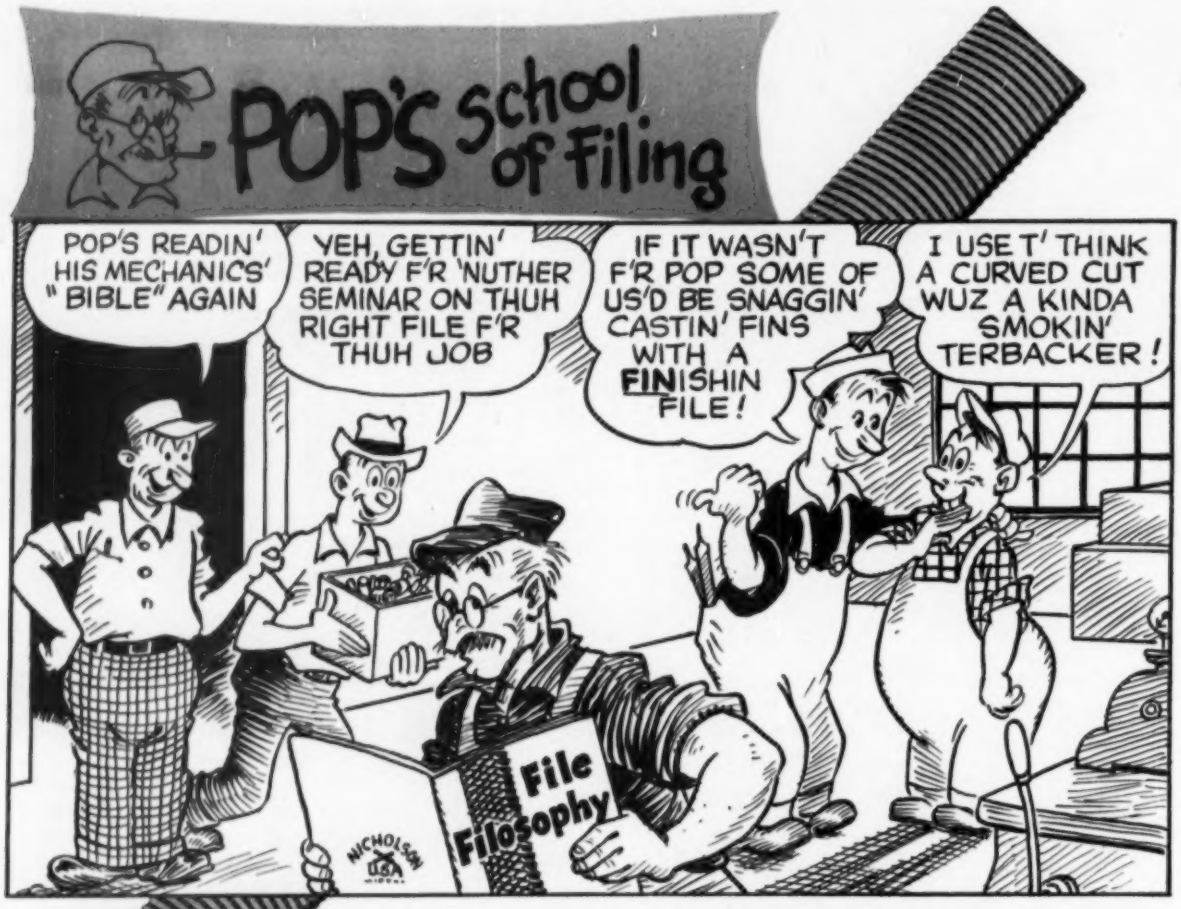
Street _____ City & State _____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POP'S READIN' HIS MECHANICS' "BIBLE" AGAIN
YEH, GETTIN' READY F'R 'NUTHER SEMINAR ON THUH RIGHT FILE F'R THUH JOB
IF IT WASN'T F'R POP SOME OF US'D BE SNAGGIN' CASTIN' FINS WITH A FINISHIN FILE!
I USE T' THINK A CURVED CUT WUZ A KINDA SMOKIN' TERBACKER!
File Filosophy
NICHOLSON
NICHOLSON U.S.A. SUPERIOR

← *Nicholson Superior Milled Curved Tooth File (rigid tanged type) for flat surfaces*

Changing personnel in industry creates a never-ending educational need on the subject of files and filing. In the shop-school the logical teacher is usually the shop foreman or production superintendent. In the training school it is the *school-shop* instructor. In either case the logical textbook is Nicholson's "FILE FILOSOPHY." (And the logical files for demonstration and practice are Nicholson or Black Diamond!) It has become universally accepted as an authority and practical guide in the art of filing. From the *16th edition* we quote:

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Vol. 42 No. 3

MARCH, 1953

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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☆ ☆ ☆

This Month's Cover

The cover picture chosen for the March, 1953, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, portrays Delbert A. Dyke, associate professor of industrial arts at Middle Tennessee State College, Murfreesboro, Tenn., in the act of supervising one of his welding students.

☆ ☆ ☆

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ASSOCIATION NEWS

COMING CONVENTIONS

Mar. 19–21. Florida Industrial Arts Association, at Fort Homer Hesterly Armory, Tampa, Fla. Secretary, Robert Holmes, 608 Azeele St., Tampa, Fla.

Mar. 19–21. National Science Teachers Association (NEA), at Wm. Penn Hotel, Pittsburgh, Pa. Secretary, Zachariah Subarsky, High School of Science, New York 53, N. Y.

Mar. 20–21. California Industrial Education Association, at Santa Barbara, Calif. Secretary, Lee D. Bodkin, 131 Education Building, UCLA, Los Angeles, Calif.

Mar. 24–27. Southeastern Arts Association, at Gatlinburg, Tenn. Secretary, Flo Bottari, 503 S. Blvd., Tampa, Fla.

Mar. 27. Tennessee Vocational Association, at Nashville, Tenn. Secretary, W. A. Seeley, State Department of Education, Nashville, Tenn.

Apr. 17. Industrial Education Conference, at Memorial Union, Ames, Iowa. Chairman, Lowell L. Carver, 101 Industrial Arts Bldg., Iowa State College, Ames, Iowa.

Apr. 17–18. Louisiana Industrial Education Conference, at Northwestern State College, Natchitoches, La. Chairman, Dr. Walter J. Robinson, Northwestern State College, Natchitoches, La.

Apr. 23–25. Indiana Industrial Education Association, at Hammond Civic Center, Hammond, Ind. Secretary, H. G. McComb, State Director of T. & I., 215 State House, Indianapolis, Ind.

Apr. 28–29. American Council of Industrial Arts Supervisors, at Statler Hotel, Detroit, Mich.

Apr. 29. American Council of Industrial Arts Teacher Education, at Statler Hotel, Detroit, Mich.

Apr. 30–May 1. Wisconsin Association for Vocational and Adult Education, at Schroeder Hotel, Milwaukee, Wis. Secretary, C. D. Rejahl, 211 N. Carroll, Madison.

THE PENNSYLVANIA INDUSTRIAL ARTS ASSOCIATION

A real professional meeting was held on November 19, 1952, by the Pennsylvania Industrial Arts Association. All superintendents, supervising principals, principals, and shop teachers of Allegheny County had been invited to the meeting at Brentwood High School.

A panel consisting of Irvin Shutsy, director, State Teachers College, California, Pa.; Don Moon, teacher, West Mifflin Borough Schools; Jules Bertin, teacher, Avonworth Schools; Art Taggart, teacher, Harrison Twp. Schools; Jim Criswell, teacher, West Mifflin Borough Schools; John McClosky, principal, Springdale Jr. High School; Philip Young, teacher, Neville Island Schools; and Dr. S. L. Coover, head of industrial-arts department, State Teachers College, California, Pa.; discussed the following topics: our industrial-arts program; safety; industrial arts in daily living; needs for industrial arts; elementary industrial arts; industrial arts and the administration; and industrial arts in our state.

MU SIGMA PI INITIATION

Jack Duvall, Paul Hunt, and Emerick Hrabovsky were initiated into the Mu Sigma Pi fraternity on December 5, 1952, at the Wayne Student Center. The initiation ceremony was conducted by Charles Sechrest. Members of the initiating team were Messrs. Stoddart, Slagle, Stoelting, Wright

(Continued on page 6A)

Initiates, 1952 Alpha Kappa Chapter of Epsilon Pi Tau, Western Michigan College, Kalamazoo, Mich.

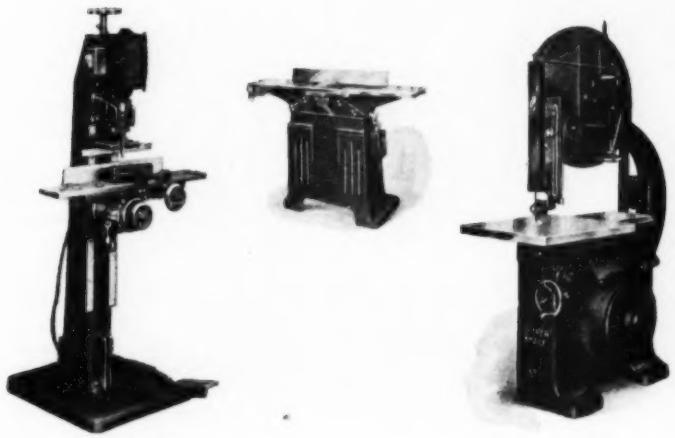
Front row, left to right: Harry Brown, George Henck, Norman Russell, Andrew Luff, John Plough, Herbert Ellinger, George Kahrman

Second row, left to right: Neil Schoenhals, William Braun, Richard Bentley, Roger Hummel, Robert Johnson, Dr. John Fuzak, Bernard Kennedy, Bernard Leech

Back row, left to right: James Dissette, Robert Swuss, Donald McDowell, Sylvester Szymczak, Duane Brooks, William Yena, Fred Konrath, Vaughn Best

Over 2300 vocational shops use "Oliver" Woodworking Machinery

to give their students the right training

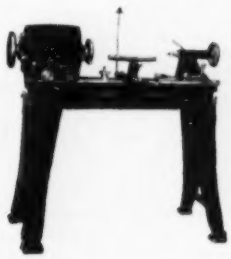


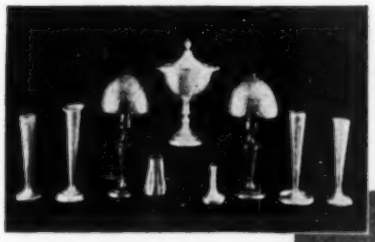
STUDENTS trained on "OLIVER" equipment have a decided advantage. They enter industry with a sound training as a basis for further progress, reflecting credit upon your instruction. Instructors in over 2300 vocational shops agree that "Oliver" machines do give more for the dollar in performance.

The ability to "take it" year after year without flinching characterizes "Oliver" machines. They are designed and built for industry by engineers who also have the latest safety features.

"Oliver" machines are easy to operate. Students soon learn to set up an "Oliver" accurately. Self-locking devices keep machines in perfect adjustment.

The machines shown here are but a few of a complete line to make your efforts most effective.





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helpful and valuable in any shop!

You can spin beautiful as well as useful vases, cups, trays, etc., from pewter, copper, bronze and other sheet metals. The "Oliver" No. 159-M Metal Spinning Lathe is precision-built with extra heavy bearings to withstand severe service. Has ball bearing variable-speed motor-driven headstock and live tail center. Swings 12" diameter, 24" between centers. Lathe can also be used for turning wood and soft metals.

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ASSOCIATION NEWS

(Continued from page 4A)

Lahti, Graham, Kepler, Earl Brown, and Cliff Baker.

Jack Duvall teaches at the Washington Trade School and has had extensive teaching for the U. S. Army, Michigan School of Trades, and Lawrence Tech. He is active in educational organizations, and presently is chairman of the 25th anniversary celebration for the MIES next April 17, in Grand Rapids.

Paul Hunt teaches driver education at Northern High School. He is a past president of the Mu Sigma Pi Mathetes fraternity, and is working toward a master's degree in special education.

Emerick Hrabovsky teaches woodworking at Cleveland Intermediate and is working toward the master's degree.

After an enjoyable dinner, President Stoddart introduced Professor Emeritus William Sargent, who spoke on the subject "Science and the Shops." Mr. Sargent presented many examples of common shop activities and illustrated their direct relation to the sciences of physics, chemistry, electricity, and the like.

He concluded with the following observations to industrial-education teachers: (*a*) encourage the pupil's curiosity toward everyday science, and its application in the various shops and drawing rooms; (*b*) place greater stress on helping pupils look for *reasonable* answers when making computations; (*c*) co-operate with science subject teachers in joint science-shop activities; (*d*) finally, reaffirm the fact that our orderly universe calls for direction by a *chief engineer*.

The Initiation Meeting was headed by Ken Stoddart and nearly fifty members attended. Manson Taylor was in charge of reservations, and Jack Slagle handled photography for the evening.

EDUCATORS STUDY CHICAGO TRADE SCHOOL

The Chicago Metropolitan Round Table held their annual fall meeting at the Greer Trade School, 2230 South Michigan Avenue in Chicago, on Friday, November 14.

Over 250 shop teachers, principals, superintendents, guidance directors, and state officials attended the dinner and inspection of the Greer School.

Enrique Bravo, Consul of Mexico, made a fine presentation on *Shop Training 'Round the World*.

Sidney Eng and J. Morgan Johnson of the Illinois State Department of Public and Vocational Education were in attendance. Mr. Eng was formerly with the Milwaukee School of Engineering. Mr. Marshall Malloy, State Investigator, represented the Illinois State Department of Registration, Dr. Homer J. Smith of Minnesota, Dr. H. H. London of Missouri, Dr. M. Ray Karnes of Illinois, Professor Harry Pederson and Professor Howard Olson, Plattesville Teachers College, Plattesville, Wis., Professor Ralph Whalin, Eastern Kentucky State College, Professor E. Glazner, Arkansas A & M, attended in a group.

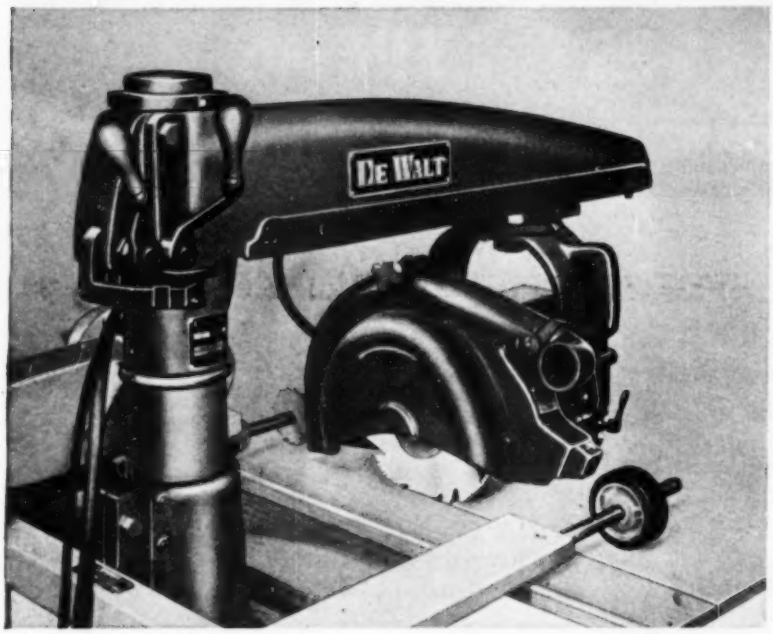
Erwin Greer, founder of the 50-year-old trade school, furnished the dinner to the entire membership. John Oklepek, president of the Metropolitan Round Table opened the meeting and Hugh P. Harshbarger, superintendent of Greer School was master of ceremonies.

One feature of the meeting was the introduction of three blinded boys who are learning piano tuning and repair.

♦ New Minnesota Vocational Association officers for 1952–53 are: Harold M. Lehto, president;

(Continued on page 72A)

TRAIN YOUR STUDENTS ON A DE WALT



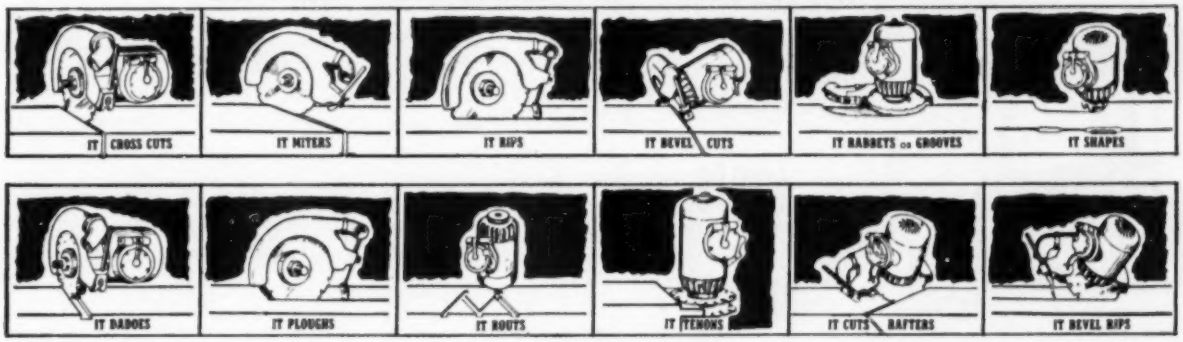
EASIEST TO LEARN!
SIMPLEST AND SAFEST TO OPERATE!

DE WALT'S EXCLUSIVE

"3 adjustment action"

assures greater ease and flexibility!

DE WALT PERFORMS ALL THESE OPERATIONS



Get your students off on the right foot to success—train them on a De Walt, today's most widely-used power saw. De Walt, the first radial arm saw developed, gives you *unmatched* flexibility, precision, speed and versatility.

Where most machines require at least 4 adjustments, De Walt's "3 adjustment action" makes it possible to position the saw for any desired cut in seconds! On a De Walt, your students can quickly and safely learn to make 15 set-ups, 15 different cuts...*in less than 15 minutes!*

Give your students the advantage of this fine De Walt training. They'll reap its benefits when they become active in industry. Available in models from ½ to 10 h.p.

Ask a De Walt dealer about the two De Walt 16 mm movies dramatically demonstrating the many uses of the De Walt—ideal for classroom showings. Write for illustrated catalog, Dept. IA-3.

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POWER SAWS

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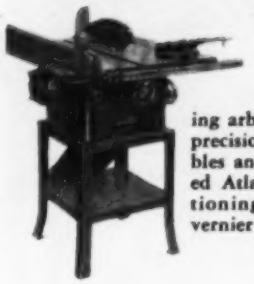
Atlas SOUND TOOL INVESTMENTS For EVERY TYPE OF SHOP

10" SAW

Cuts 3¼" deep; 20" x 27½" table, precision-ground — 12" right of blade, 13" ahead — extensions available. Quick-positioning fence, with vernier control.

10" AND 8" SAWS



8" model is shown. These are both tilting arbor saws with precision-ground tables and the patented Atlas quick-positioning fence with vernier control.

12" BAND SAW

Ideal size for school shops. 14" x 14" precision-ground table tilts 45°. Cuts stock to 6¼" thick. Ball bearing equipped wheels and blade supports.

24" JIG SAW

The finest! 14" x 14" precision-ground tilting table with 90° swivel. 4 speeds for wood, light metal, plastic, composition. Cuts 2¼" thick.

Atlas Woodworking Tools

Whatever your educational sphere — junior or senior high industrial arts, or vocational education — you can't select better woodworking tools for your shop than those shown here. (1) Atlas woodworking tools are ruggedly built to stand hard use — their long-wearing qualities get the nod from budget-minded administrators. (2) *Each tool has exclusive features* that help students do better work, reduce material spoilage, and simplify instruction. Moving parts are carefully guarded. (3) Atlas low prices help you make the most of restricted funds — also appealing to those who watch the budgets. Get *full* details about the tools you'll be needing *before* you plan your requisitions for next term. Ask your Atlas dealer, or send today for latest catalog.

6" JOINTER

42" long precision-ground table, 32" x 4½" tilting fence supported close to cutter head. Sealed-for-life ball bearings.

12" WOOD LATHE

36" between centers. Sealed-for-life ball bearings. Lever-controlled bed locks on tailstock and tool support base. 4 speeds.

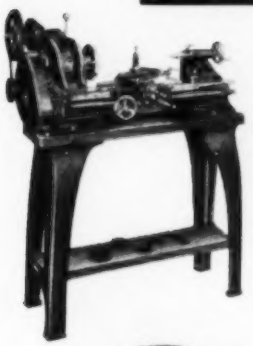
DRILL PRESSES

15" floor and bench models include new operating and durability features. 4 ball bearing "floating drive" for long accuracy life. Extra-heavy head, table, column, base. New depth control stop. 12¾" bench size also available.

FREE 5 HELPFUL WALL CHARTS and ATLAS CATALOGS • Send for Them Today

Atlas PRECISION TOOLS MEET SCHOOL NEEDS BEST!

10" LATHES



The only low-cost lathes with Timken tapered roller bearings. 16 spindle speeds; power cross and longitudinal feeds standard equipment. Greatest value by far for school shops.

CLAUSING 12" LATHES

Clausing 6300 and 4800 series 12" lathes have the power, precision, capacity, ruggedness to teach lathe fundamentals with maximum thoroughness. Timken bearing equipped, quick-change gears, 12¾" swing over bed, 24" — 36" — 48" between centers.

Atlas Metalworking Tools

Atlas metalworking tools are today's best school shop buys! *They're priced as low or lower than any comparable on the market* — yet give you more outstanding precision features (many of them Atlas "exclusives") for a lifetime of *accurate, dependable shop service.*

You'll appreciate their extra-heavy, rugged construction, fine precision bearings, simplified operation, and exceptional versatility. Atlas tools help students learn quickly and get a broader understanding of the basic machining principles.

When you make up your equipment requisitions this year, keep *low-cost industrial quality* Atlas tools in mind. Send for the latest catalog.

CLAUSING 18" DRILL PRESS

New, heavy-duty drill with many exclusive features for broad and thorough instruction. Drills to center of 18¼" circle. Capacity, ¾" in steel, 1" in cast iron — 6½" spindle travel.

DRILL PRESSES

15" floor and bench models include new operating and durability features. 4 ball bearing "floating drive" for long accuracy life. Extra-heavy head, table, column, base. New depth control stop. 12¾" bench size also available.

7" SHAPERS

The only compact shapers with all the sturdy construction and operating features of large shapers, built down to size. Timken tapered roller bearings. Crank type ram drive. 4 speeds, 5 automatic cross feeds.

MILLING MACHINES

You can instruct in all milling operations with Atlas millers. Timken bearings, 8 spindle speeds — 62 to 2870 rpm. Back-geared power. V-belt drive. Only low-cost miller available.

ATLAS PRESS COMPANY

306 N. PITCHER STREET • KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

TRAIN YOUR STUDENTS ON THE SAME

COLUMBIAN VISES

THEY WILL SOON USE IN INDUSTRY!

Your students, as they enter industry, will find Columbian Vises handling thousands of necessary jobs in leading industries.

So—why not train them on Columbian Vises today and prepare them properly for those essential production jobs on which they will use Columbian Vises tomorrow!

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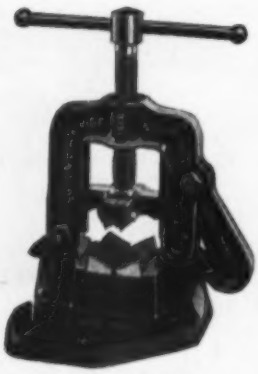
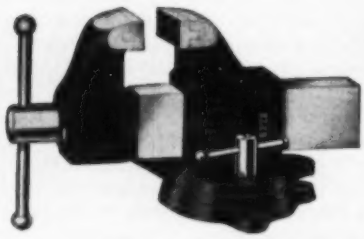


HINGED PIPE VISES



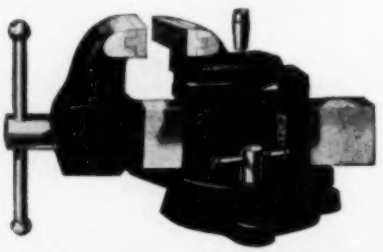
MACHINISTS' VISES

WOODWORKERS' VISES

there is a COLUMBIAN VISE for every need and purpose...

HYDRAULIC VISES

WORKSHOP VISES



ADJUSTABLE JAW—SWIVEL BASE VISES

COLUMBIAN

Vises The Columbian Vise & Mfg. Co.

CLEVELAND 4, OHIO

MANUFACTURER OF COLUMBIAN-STEVENS LEVELS

Like meeting an old friend...

...when students are trained on BLACK & DECKER TOOLS!

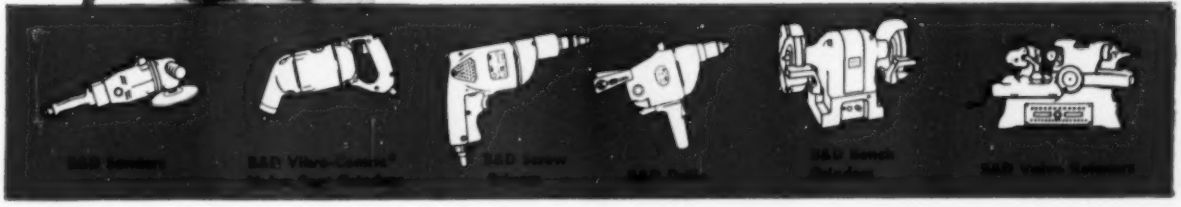
Using Black & Decker Tools to train your students helps ease the switch from school to shop. That's because Black & Decker Tools are most popular in shops throughout the country . . . they're the tools your students will meet most in industry!

What's more, students—and teachers—find Black & Decker Tools dependable . . . easy to use . . . easy to learn on. Built-in safety devices cut down beginner nervousness. *And B&D Tools cost you less in the long run because they outlast cheaper types!* See your nearby B&D Distributor for complete information. Write for free catalog to: THE BLACK & DECKER MFG. CO., 616 Pennsylvania Ave., Towson 4, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

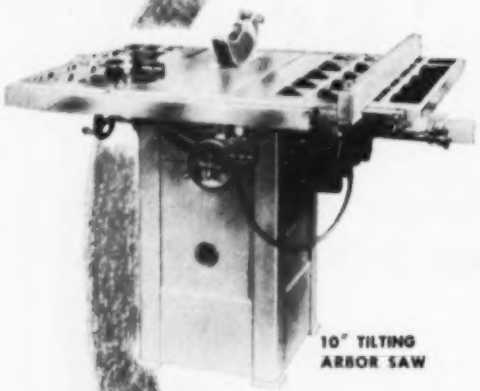
B&D Black & Decker PORTABLE ELECTRIC TOOLS

*Trade Mark Reg. U. S. Pat. Off.



Designed for easier shop instruction

...and they're easier on shop budgets



10" TILTING ARBOR SAW

Students learn faster when you teach them with Walker-Turner Light-Heavyweight Machines. These are easy machines to operate. They're built for *safety*, first. By enabling the student to become a skilled operator sooner, Walker-Turner *design* makes shop instruction easier, and more rewarding.

See the complete line of Light-Heavyweight machines at your Walker-Turner dealer's.

10" TILTING ARBOR SAW
Capacity 3⅛". Table 32½" deep and 44¾" wide with extensions. Speed 3800 r.p.m. Two dust-sealed ball bearings. Safety guard, splitter and anti-kick back pawls. Single control locks rip fence front and rear, micrometer adjustment.

16" BAND SAW
Capacity 16" between blade and frame—8" under guide. Table: cast iron, 18" x 17" carefully machined. Guards: cast aluminum, provide full protection. Single speed models for wood and plastic cutting and multi-speed models for metal cutting.

VARIABLE SPEED LATHE
Gap-bed type with full ball bearing head stock. No. 2 Morse Taper centers. Range from 660—3600 r.p.m. with a 1740 r.p.m. motor. Speed of spindle shown on a graduated scale in full view of operator. Variable speed drive and motor mounted inside heavy cast iron pedestal, protected from dust.

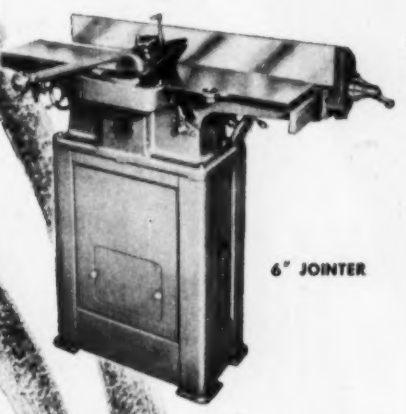
15" DRILL PRESS
Spindle travel 4". Capacity (*floor model*) 39⅜" chuck to table, 46" chuck to base. Drills ½" in cast iron, ⅜" in steel. Drills to center of 15" circle. 4 speeds: 600, 1250, 2440, 5000 r.p.m. with 1740 r.p.m. motor. One-piece, cast-iron head casting; six spline full floating spindle, ⅝" diam.

VARIABLE SPEED LATHE

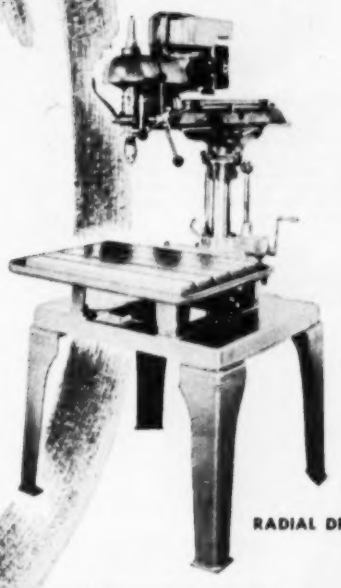
16" BAND SAW

15" DRILL PRESS

WALKER-TURNER *LIGHT-HEAVYWEIGHT* Machines



6" JOINTER



RADIAL DRILL

Professional in design and operation, yet light for production machines, the Walker-Turner Light-Heavyweight line gives the industrial arts and vocational school the needed accuracy, ease of handling, and safety features for efficient student training, *without the necessity of heavy investment.*

Send for booklet describing in detail the complete Light-Heavyweight line.

20" DRILL PRESS
Spindle travel 6", 5 speeds. Capacity ¾" in steel, 1" in cast iron. Distance spindle to column 10". Max. distance spindle nose to table 44". Balanced pulleys, ball bearings throughout. In Bench, Floor and Multi-spindle models (2 to any desired number of spindles.)

6" JOINTER
Knives: 6" wide. Dual-purpose guard enables operator to plane stock ribbon thin with absolute safety. Three-knife, approved safety type, 2½" diameter. Rear knife guard keeps knives covered always. Big table: over 7" wide and 37½" long. 11,700 cuts per minute.

VERTICAL SPINDLE SHAPER
Two speeds: 7000 and 11,000 r.p.m. Spindle 17" long, journaled on pre-loaded ball bearings. Cutter spindles interchangeable and fully protected by adjustable guards. Belt and pulleys completely guarded. Table: 22" x 33" —milled slot for miter gauge ¾" x 13/32".

RADIAL DRILL
15 spindle speeds: 110-5400 (using 1140 r.p.m. motor); 160—8300 (using 1740 r.p.m. motor). Ball bearing thrust collar carries head and ram assembly. Drill can be tilted in either direction, to any angle up to 45°. Quick-action lock secures drill in any position, assures maximum amount of deflection.

SOLD ONLY THROUGH TRAINED INDUSTRIAL DISTRIBUTORS

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
WOOD AND METAL CUTTING BAND SAWS • TILTING ARBOR SAWS
RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS
JOINTERS • BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES

20" DRILL PRESS

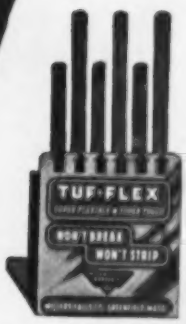
VERTICAL SPINDLE SHAPER

Use this space

to write for full details and specifications.
Walker-Turner Division, Kearney & Trecker Corp.
Educational Dept. IA-3, Plainfield, N. J.
(Please write your name and address in margin of page).

HAND AND BREAST DRILLS. Favorites of expert craftsmen for generations. Sturdy, smooth operating. Built for lifetime use.

2-SPEED, 100° ANGLE BUFFING AND SANDING ATTACHMENT. Fits any ¼" electric drill. Complete kit in eye-catching, self-sale display package.

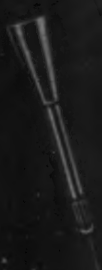


HACK SAW BLADES in colorful, compact, self-selling displays. Super-flexible, super-tough "Tuf-Flex"® — finest of all general purpose hack saws. Remarkable, high speed "Blu-Flex"® — the new, unbreakable blade for cutting hard alloy steels.

GRINDING HEADS. Fitted with "Oilite" bronze bearings. Made to give years of service. Drives from above, behind or below.

"NESTS OF SAWS." No. 725 shown. Also new No. 2370 available at special price for Hardware Week. Write for particulars.

SPIRAL RATCHET SCREW DRIVERS. Smooth acting, fast. Automatically drives or draws screws. Available with or without return spring.

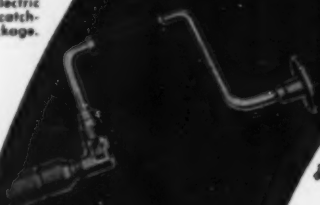


AUTOMATIC DRILLS. For quick, one hand* small hole boring. A famous line known and preferred the world over.

LEVELS THAT LAST. Aluminum* models, light and rigid. Wood levels of finest straight grain white pine. Hands, low cost "Torpedo" and "Line Level." High accuracy.

HACK SAW FRAMES. Finely balanced, sturdy. Firm, comfortable grips. A wide choice of styles and types. Each an outstanding value.

BIT BRACES. The world's largest selling quality braces. Traditional favorites of skilled craftsmen. Plain and ratchet models for every need.



PLANES. Many unique and improved features. Each built to the highest standards in design, workmanship and finish. Complete line including Block, Bench, Rabbet and Router Planes.

COMBINATION SQUARES. Precision made with accurately milled beams and graduations clearly etched — not stamped — on blades.

MILLERS FALLS TOOLS
SINCE 1868
The Mark of Superiority

ELECTRIC DRILLS, KITS and STANDS. High performance, general utility line. ¼" and ½" sizes. More powerful than any comparable drills on the market.

MICROMETERS. Produced for extreme accuracy and dependability. Part of Millers Falls wide line of fine machinists and precision tools.

No. 966 SANDER-POLISHER. Buffs, sands, grinds, polishes, waxes, wire brushes, drills, mixes paints. The most versatile portable power tool available.

UTILITY KNIFE — a brand-new profitmaker with strong impulse sales appeal. Packed six individually packaged knives in eye-catching self-display carton.

The Best Tools in Any Language

ELECTRIC SAWS. 7-, 9- and 10-inch models. Light, rugged, compact. New, high-capacity 7" saw weighs only 11 lbs. Designed for continuous, heavy-duty production work.

SCREW DRIVERS. Plain, Ratchet and Offset. Each blade of highest quality alloy steel . . . each torque-tested, to rigid standards.

"LANGDON ACME" and "ALL-STEEL MITRE BOXES." For years the mitre boxes preferred by professionals for fast, easy, accurate work.

WRITE FOR CATALOG No. 49

176 pages illustrating and describing the greatest line in Millers Falls 85 years of quality toolmaking.

MILLERS FALLS COMPANY
Greenfield, Mass.

RADIAL ARM SAW—Mitres, compound miters, cross-cuts, rips, dados, grooves. With 8" blade, 3-9/16" cut. With 10" blade, 3-9/16" cut.
HORIZONTAL OR VERTICAL DRILL PRESS—3 speeds, 21" throat. Tilt table to drill, rout or mortise at any angle, in a 45° arc.
BELT-AND-DISC SANDER—Either belt or disc locks in vertical or horizontal position, or at any angle.
Shop

Shopmaster presents the sensational

universal

INDIVIDUAL COMBINATION POWER TOOL

Here at last, is a woodworking power tool so versatile, so universal in use—it amounts to a complete workshop. The amazing new Shopmaster Universal can not only do a hundred-and-one jobs formerly requiring individual tools—but it can actually perform operations *impossible with any other tool!* Built to Shopmaster's usual standards of precision workmanship, this new Universal is a power tool worthy of the finest professional craftsmen—yet simple and easy for a novice to operate.

The Shopmaster Universal combines dozens of features to assure top performance and long, maintenance-free life. All moving parts glide on sealed-for-life ball bearings. Matched four-step pulleys make available a range of four speeds. A reversing switch makes left hand drill and router bits unnecessary. Tool changes can be made in seconds.

It's a

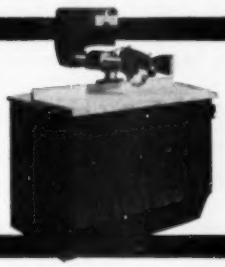
Circle Saw, Sander, Drill Press, Router, Shaper, Lathe

All in one

A complete, one-tool workshop, built to Shopmaster's exacting standards. An unbeatable buy!

Priced Just **$249.95** LESS MOTOR

Complete with saw, drill, disc-and-belt sander attachments, and safety type chuck. Saw attachment is furnished with 8" and 10" blade. Other tool accessories available. Complete unit mounts on special table as shown at the right.



RUSH COUPON FOR DETAILS!

SHOPMASTER, INC. Dept. 0000
1214 Third Street South, Minneapolis, Minn.
Send information on Shopmaster Universal Power Tool, TODAY!

*Name*_____

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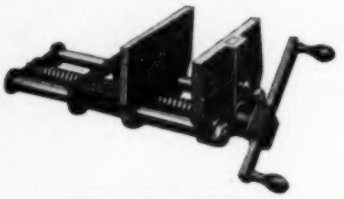
STANDARDIZE FOR ECONOMY SAFETY AND RIGIDITY WITH MORGAN VISES

For your Woodworking Classes

ADJUSTABLE STEEL HANDLE — Stop in Front Jaw

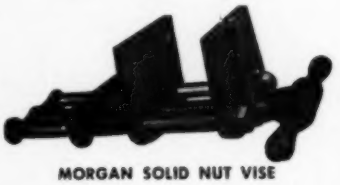
Designed to stand continuous and severe service for a lifetime. The extra heavy cold rolled screw and solid nut, careful machining of all parts, and the cold rolled side bars threaded and held in place by hexagon nuts all assure firm, ALWAYS PARALLEL gripping power. Stop in front jaw for extra convenience.



CONTINUOUS SCREW VISE

MORGAN SOLID NUT VISE

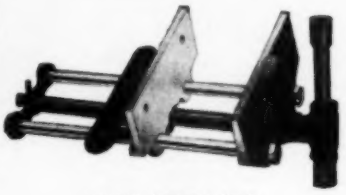
Solid nut continuous screw woodworking vise with stop in front jaw. Fully machined parts and semi-steel castings. Hardwood handle. A vise built for long service under difficult school conditions. 7" jaw width and opening. Same quality construction and materials as in other Morgan vises. With stop in front jaw.



MORGAN SOLID NUT VISE

QUICK ACTION WOODWORKING VISE

Most simple and most effective of any screw adjusting type of vise. Intercepted threads on the screw operates in a half nut. Slight turn of handle disengages the screw permitting jaw to slide in either direction. Turn in opposite direction engages the screw in the nut for speedy gripping. High quality bronze half nut, carefully machined working parts. Available with or without stop in front jaw.



QUICK ACTION VISE

For your Metalworking Classes

MACHINISTS BENCH VISE
Solid Jaw and Stationary Base

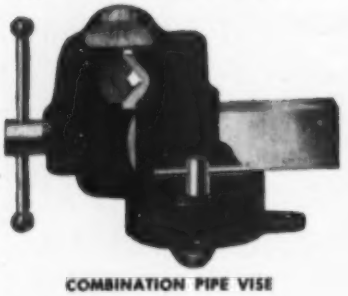
MACHINISTS' BENCH VISE — Solid Jaw and Stationary Base

Accurate milling, special semi-steel castings and the solid steel forged screw combine to make this vise always parallel, always sure in gripping power — a lifetime investment in economy and strength. Renewable tool steel jaw faces and interchangeable parts at low cost means that you buy Morgan Machinists' Bench Vises just once and never replace them.

MACHINISTS' BENCH VISE
Solid Jaw and Swivel Base

MACHINISTS' BENCH VISE — Solid Jaw and Swivel Base

Extreme rigidity and strength in a swivel base vise is possible here because of the Morgan careful workmanship and close inspection of all milled parts. Though the turning action is quick, the specially designed nut for locking the base in any angle prevents play despite heavy duty. Renewable tool steel jaw faces and interchangeable parts.



COMBINATION PIPE VISE

COMBINATION PIPE VISE

This swivel base combination pipe and machinists' vise offers the convenience and strength of both vises. Ruggedly constructed, carefully milled, it offers economy and long life because it embodies the best of Morgan workmanship and materials.

WHY MORGAN VISES?

Strength — Continual tests for breaking strain keep the semi-steel castings always high quality and assure strength where it is needed.

Rigidity — Working to close tolerance in milling the sliding bar and cutting of the acme threads means no play, no wobbling under the severest tests.

Renewable Tool Steel Jaws — Jaws on every machinists' vise are milled to be and stay perfectly parallel.

The Screw — Forged from solid steel and cut with acme threads. Handle on the screw is made in one piece, with balls being forged on each end.

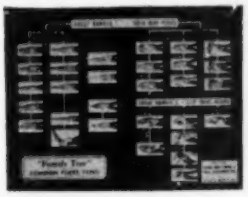
The Nut — Carefully made of malleable iron, fitted snugly into the slot in the body of the vise.

Write today for our catalog of Morgan Woodworking and Machinists' Vises.

THE MORGAN VISE CO.

120 N. Jefferston St., Chicago 6, Ill.

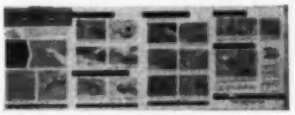
Ⓐ "FAMILY TREE OF COMMON PLIERS TYPES"



Wall Chart

A pictorial chart that is self-explanatory to students — giving a clear, basic knowledge of major pliers and their variations. An invaluable aid for instruction use. (21" x 10" in two colors.)

Ⓑ "HOW TO USE PLIERS" — Wall Chart



The basic information contained in this wall chart is very helpful to the user of pliers. It shows the proper way to hold pliers, which size and shape pliers to use for your specific purpose — and other interesting features. Saves instruction time; is easy to use. (32" x 12" in two colors.)

Ⓒ "WHY DROP FORGED TOOLS LAST LONGER" — Wall Chart

This chart illustrates how drop forging and induction hardening make pliers, adjustable wrenches and other tools more serviceable. It's good background for every user of hand tools. (32" x 12" in two colors.)

Ⓓ "PLIERS AND ADJUSTABLE WRENCHES"

Comparative Chart

This chart is designed as an aid in comparing the tool numbers of pliers and adjustable wrenches of various manufacturers. Users can easily keep it current on this basic framework. Interesting, informative, and easily displayed.

Ⓔ "FIRST AID FOR PLIERS"

Booklet

Eight pages on the care and repair of pliers — citing the five most common "pliers ailments" and complete description of how these can be remedied. (2 colors.)

Ⓕ "FIRST AID FOR ADJUSTABLE WRENCHES"

Booklet

Four pages on the care and repair of adjustable wrenches. This booklet lists points which require "first aid" and prescribes simple treatments. (2 colors.)

Ⓖ "FOR ADJUSTABLE WRENCHES"

Pamphlet

A further description of Utica's "induction hardening process" as applied to wrenches and its importance in preventing burring and nicking.

Ⓗ "MOST POPULAR TOOLS"

Pamphlet

Shows the 16 most popular Utica tools with the most important uses and capabilities of each. Pictures and sizes available are included.

Ⓘ AVAILABLE UTICA MOVIES—

"Add Power to Your Hands"

(The rolling, forging, machining and heat treating of steel in the manufacture of modern hand tools.)

"Pliers: Their Use and Care"

(each 10 minutes, black and white, 16 mm., sound)

The value of movies as training aids has long since been established and Utica makes these excellent films available to you on a loan basis. You pay return postage, only.

Ⓙ "UTICA MOVIES"

Folder

A descriptive folder on the films mentioned in paragraph I. Get this folder if you'd like further information.

Ⓚ "TOOL USER'S GUIDE"

Complete Kit

This kit contains all mentioned aids except the movies themselves. If you wish to send for all data as one package, check "Tool User's Guide" in the coupon.

EDUCATIONAL AIDS OFFERED BY UTICA DROP FORGE

Good tools are at their best when properly used. Utica Drop Forge & Tool Corporation, manufacturer of pliers and wrenches, has developed an impressive series of teaching aids helpful in school or industrial shop teaching. To get them, use the coupon at right; they'll be sent promptly and without charge.*

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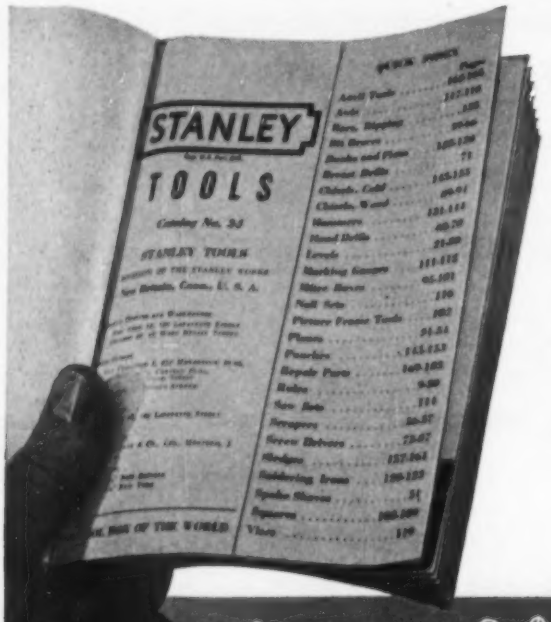

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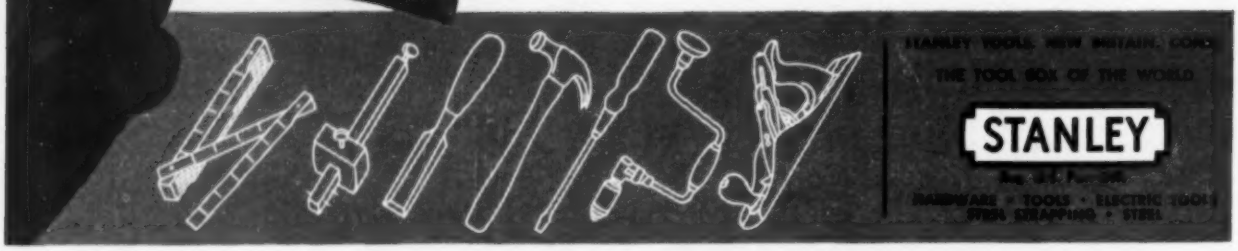

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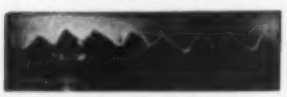

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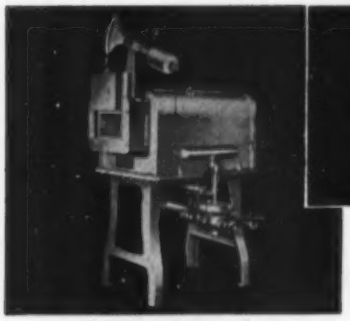

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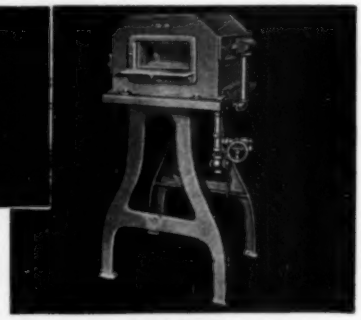

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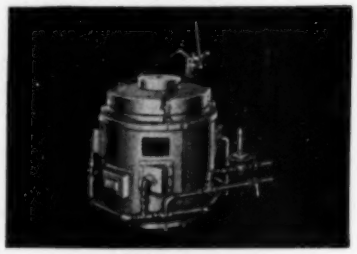

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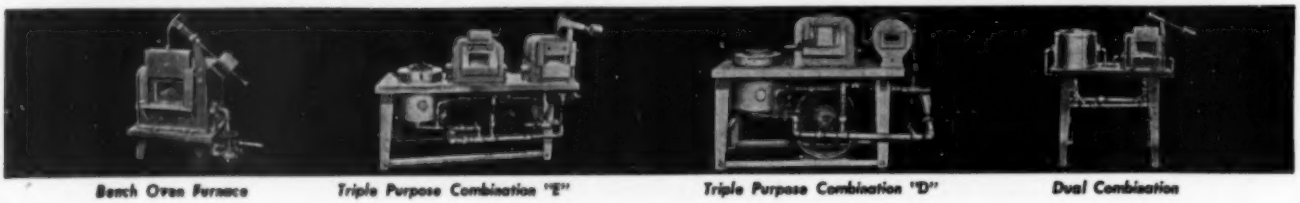

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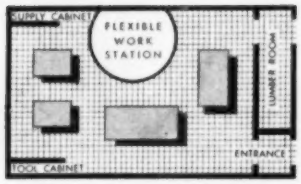
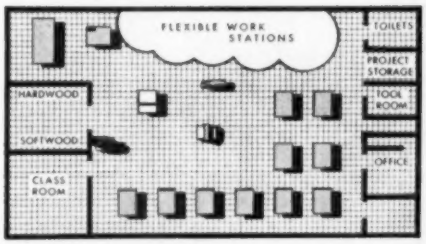
No school's too small  ...or too large  ...for Shopsmith

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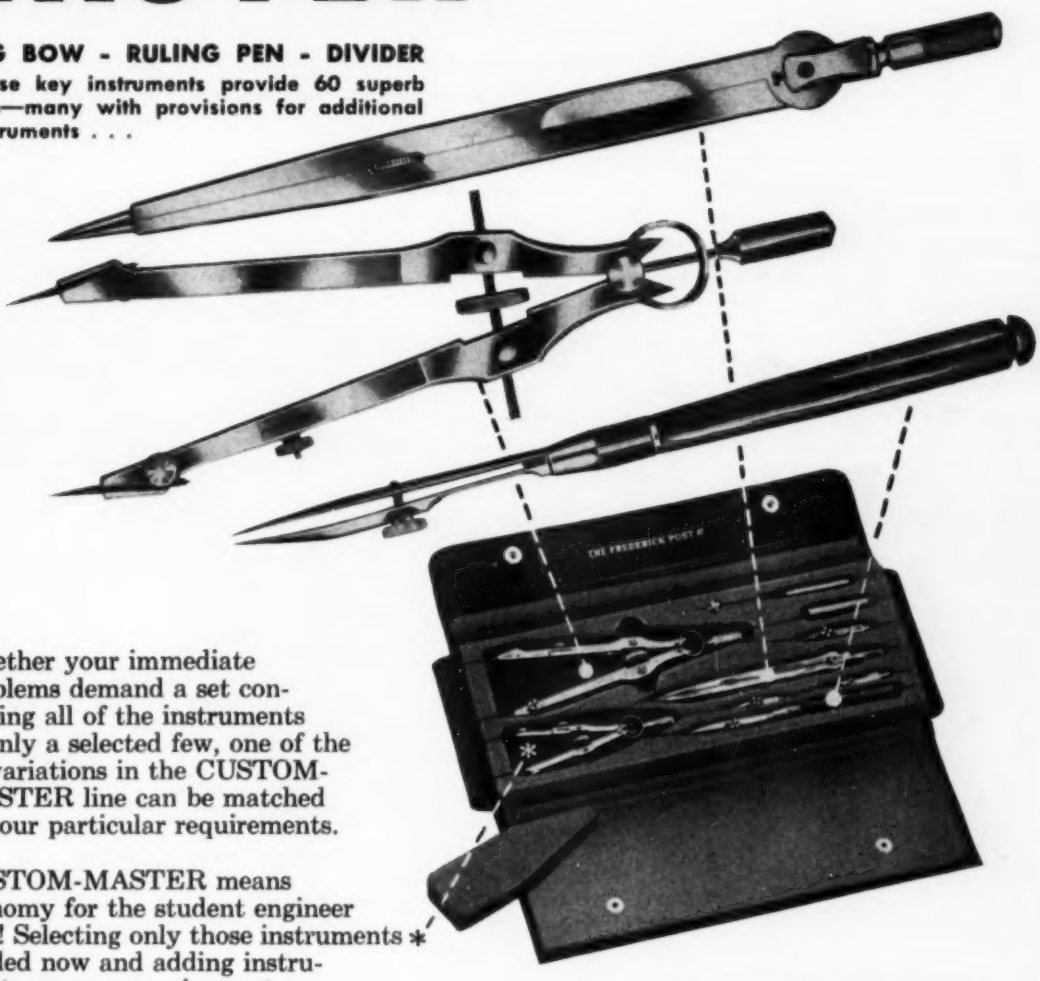

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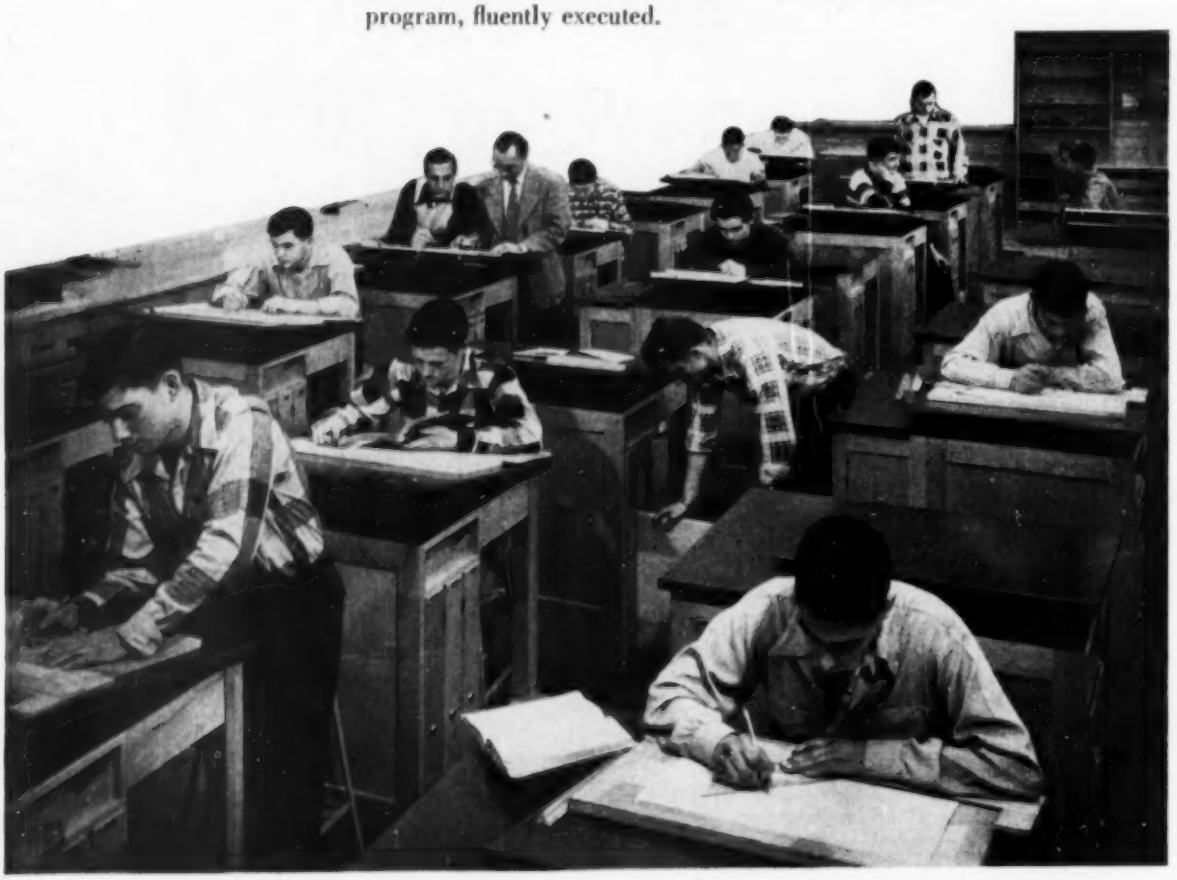

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

MARCH 1953

School Shop Planning

JOHN M. HURLEY
Acting Director of Industrial Arts
Elementary and Junior High Schools
and
LUDWIG MADSEN
Bureau of Vocational Activities
Board of Education
New York, N. Y.

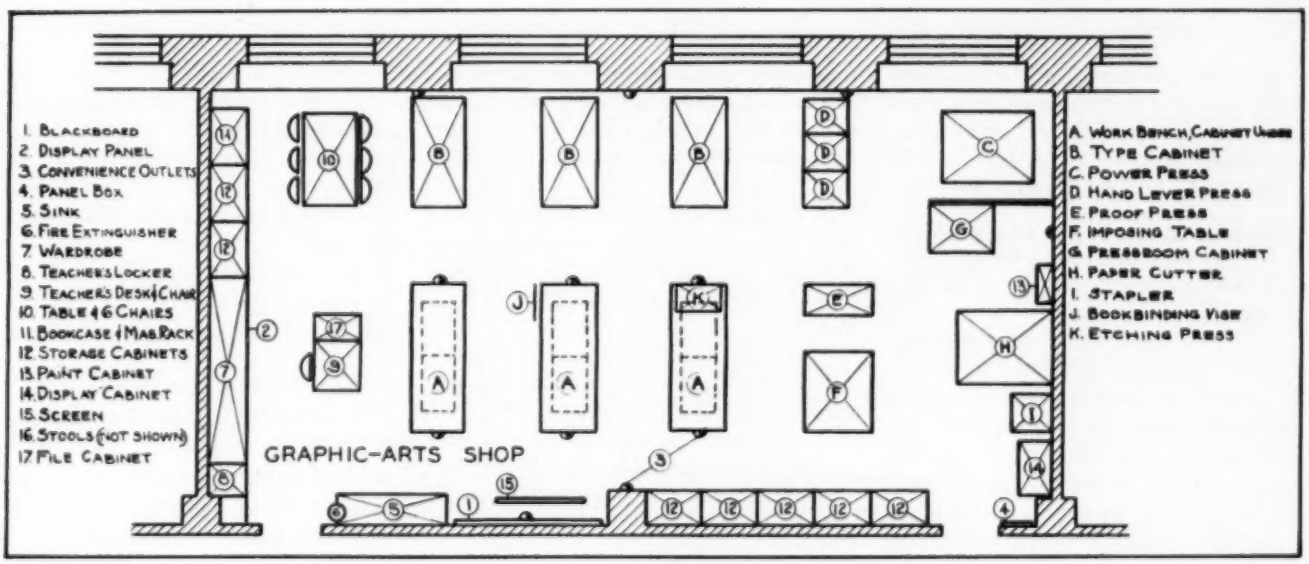
The following guides for the planning and equipping of industrial-arts shops in junior high and elementary schools are the result of the judgment of the staff of the Bureau of Vocational Activities in cooperation with the members of the industrial-arts teaching staff.

This material is offered as a guide to the Division of Housing and Business Administration, to the Bureau of Construction, and to the Bureau of Plant Operation and Maintenance in planning the construction and equipment of new school shops and the modernization of existing school shops. The course of study, maturity of the pupils, and the type of work to be done were the guiding factors in planning each shop and selecting the equipment. Basic considerations in the selection of equipment were given to safety, ease of operation, sturdiness of construction, and flexibility.

The value of the industrial-arts program in the junior high schools as a major area of general education is a recognized fact. One of the objectives of industrial arts is to provide the pupils with an opportunity to have experiences with the tools, materials, and processes of the industrial society in which they will live and participate as citizens. Another objective is to encourage and foster creative expression. These objectives, as well as others, are set forth in Curriculum Bulletin No. 11,* Industrial Arts in Grades 7, 8, and 9.

Since industrial-arts teaching is largely individual, the maximum number of pupils to be accommodated at any one time in each shop is an important factor. In preparing the material contained in this manual, this has been set at 24 pupils. For

*Reprinted as of June, 1950. City of New York, Board of Education.



Suggested layout for graphic-arts shop

efficient and safe operation, the shop should not be overcrowded.

At present the new junior high schools that are being built are designed to accommodate approximately 2000 students, 1000 boys and 1000 girls. This means that five industrial-arts shops will be needed. Industrial Arts in Grades 7, 8, and 9 referred to above specifies five areas of work to be offered. These are *general wood, general metal, graphic arts, general ceramics,* and *general electricity.* It is therefore recommended that a general unit shop in each of these areas be provided for these junior high school students.

The areas of work in each of these shops are as follows:

For the elementary schools that will have only one industrial-arts shop, the scope of work should be broadened to include metal and graphic arts as well as the traditional woodwork. The pattern as outlined above for junior high schools for wood, metal, and graphic arts may be followed in so far as time and school conditions permit.

Industrial Arts in the Junior High Schools

Shop	*Basic Activity*	*Additional Activity to Supplement the Basic Activity*
General wood	Wood Cabinetwork Model making (boat and plane) Carving	Metal Electricity Plastics Leather
General metal	Metal Art metal Wrought iron Foil modeling	Jewelry Electricity Plastics Leather
Graphic arts	Printing and typesetting Bookbinding Silk screen	Rubber stamps Photography and blueprinting Lithography Papermaking
	Linoleum block Etching	Duplicating machines
Ceramics	Modeling Pottery Ceramic jewelry Slip and plaster casting	Plaster carving Rubber molds Self-hardening clays
General electricity	Circuits Appliances Apparatus Models Toys	Radio Plating Communication Fluorescent lighting Neon lighting

Architectural and Engineering Features of the School Shop Room

1. School shops should *not* be installed in areas below street level.

2. School shops should be acoustically treated for auditory comfort.

3. Partitions between shops and adjoining rooms should be so constructed that they can easily be removed in order that future changes, if needed, may be made with a minimum of expense.

4. Utility supply services should be flexible enough to provide for future needs.

5. Doors of the shop as well as of the school should be of a width sufficient to permit passage of the largest piece of equipment in the shop.

6. School shops should be equipped with facilities for the use of audio-visual aid equipment.

7. The school shop should be so designed as to minimize the transmission of noise to other parts of the building.

Lighting and Electric Service

1. Full advantage should be taken of the possibilities of natural lighting, through maximum window area. North and east light is highly desirable.

2. Direction of light source should be given consideration in the placement of all equipment.

3. Natural light should be thought of as desirable and advantageous, but since it is so variable at different parts of the day, it is necessary to supplement it by artificial light to such an extent that the artificial light alone will provide sufficient illumination.

4. Artificial lighting should produce at least thirty foot-candles at the working surfaces. This light should be uniformly distributed and should be shadow-free and glare-free.

5. General lighting should be supplemented with additional local lighting on machines where necessary.

6. Sufficient electric service outlets should be provided which are of sufficient capacity to provide for any and all portable equipment.

Painting

1. The color scheme of the shop is of importance not only because of its effect on the eyes, but because of the psychological effect on the students in carrying on the shop activities.

2. Paint for walls and ceilings should be of semigloss with good reflecting and diffusing value, selected in harmonious and pleasing colors.

3. Furniture should be finished in light rather than dark colors.

4. Machinery should be painted in colors that will minimize eye fatigue and promote safety. It is suggested that the color scheme as outlined on page 42 of the "School Shop Safety Manual," issued by the Board of Education, City of New York, February, 1948, and on page 33 of "Shop Safety Education" issued by the University of the State of New York, 1949, should be followed.

Floors

1. Flooring should have a wearing surface designed to endure, but not so nonresilient as to be detrimental to health and safety.

2. Flooring should present a pleasing appearance.

3. Flooring should be easily cleaned.

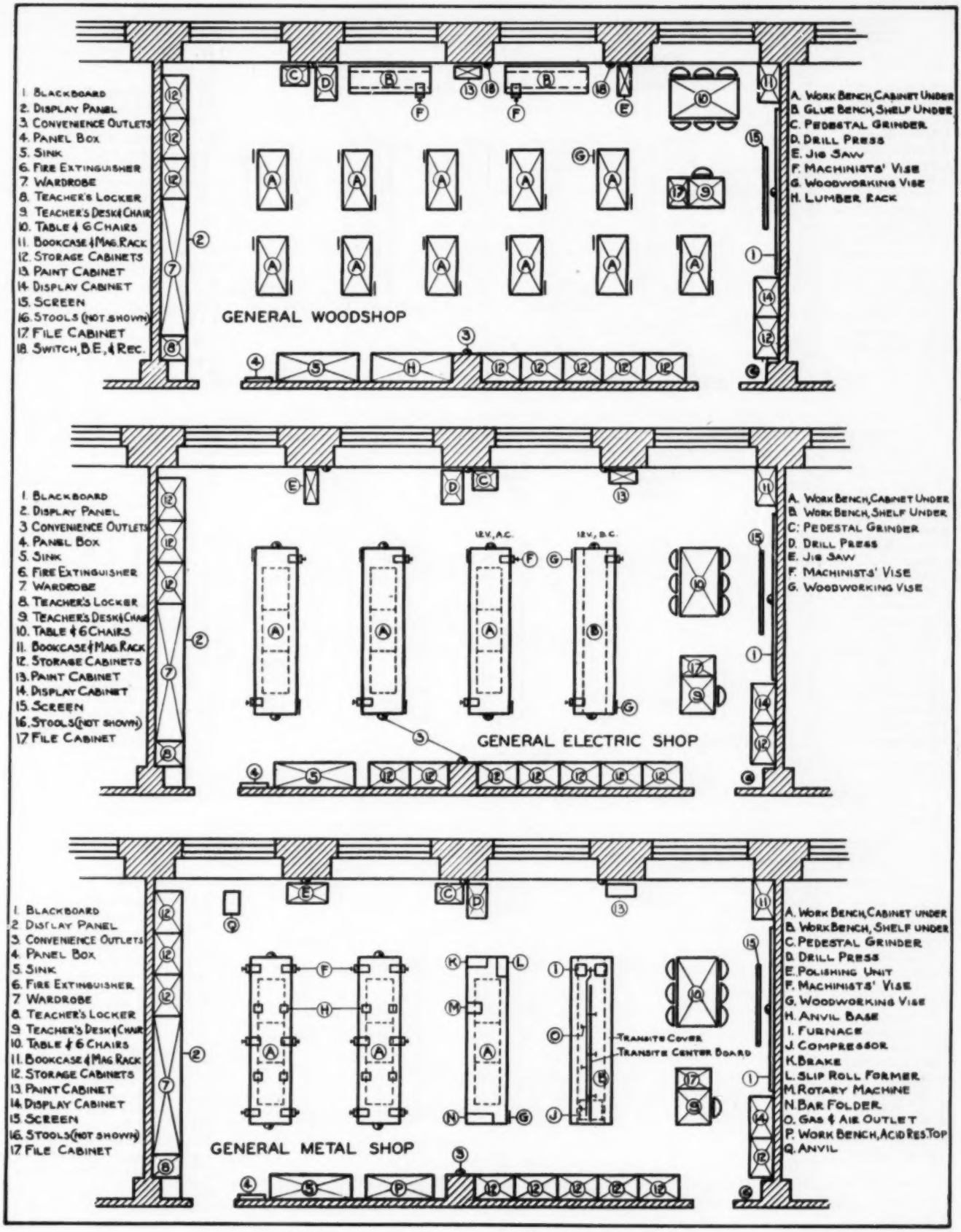
4. Flooring should be of a type and finish that minimizes the danger of slipping.

Planning the Shop

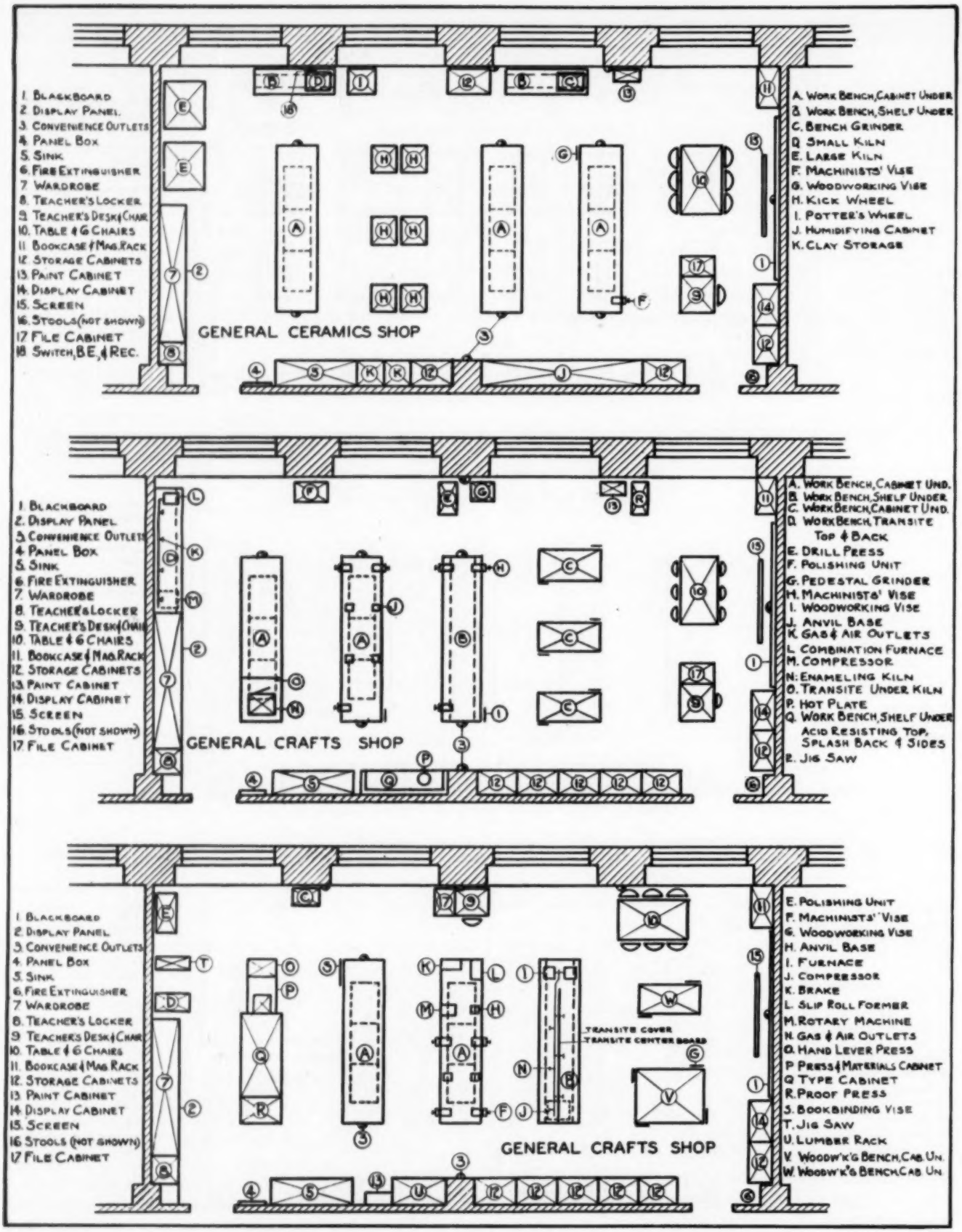
1. Suggested layouts of the various shops are shown.

2. The suggested arrangement of equipment in each shop is based on safety factors and instructional efficiency.

3. The equipment and work stations in each shop have been placed so that there



Suggested layouts for general wood, electrical, and metal shops



Suggested layouts for general ceramics and crafts shops

is a minimum of interference with adjacent students.

4. The equipment and work stations in each shop have been placed so that related activities are in close proximity.

5. The equipment and benches in each shop have been placed so that the aisle spaces are sufficient for safety and free passage and flow of traffic between all areas and points of common interest, such as the planning center, machine areas, tool storage cabinets, and supply cabinets.

6. Each shop has been planned for the use of audio and visual projection equipment.

Equipment

1. Equipment requirements for each shop are on file in the Bureau of Vocational Activities.

2. Specifications for all shop equipment are on file in the Bureau of Vocational Activities.

3. Where manufacturer and catalogue numbers are specified, it is for the purpose of indicating the type and quality that will meet the pedagogical requirements. It is not to be construed that equal and/or similar machines and items of other manufacturers will not be acceptable.

Auxiliary Rooms and Facilities

1. It is suggested that for the industrial-arts shops in the junior high schools there should be a space equivalent to a full unit to provide for storage purposes. This may be either one room or two half rooms.

2. It is suggested that for the industrial-arts shop in the elementary school some space for storage of lumber, paper, and metal should be available.

3. The location of the supply room, or rooms, should be selected with consideration for ease of handling bulky materials such as lumber, metal, and paper. Consideration must be given to the accessibility both for bringing materials into the building and supplying the shops.

4. Provision should be made in the storage area of the junior high schools for a circular saw and squaring shear for use by the teacher in preparing and cutting stock for pupil projects. A lumber rack, metal rack, shelves for paper storage, as well as shelves and cabinets for general supplies should also be provided.

Check List for Planning and Evaluating School Shops

PAUL N. WENGER
Industrial Arts Department
Teachers College of Connecticut
New Britain, Conn.

1. All parts of the shop should be visible to the teacher.

2. Avoid the use of shops constructed in the form of a *U*, *L*, or *T*.

3. Shops should be rectangular in shape, with a ratio varying somewhere between 1 to 1½ and 1 to 2.

4. The instructor's desk should be as near the entrance as good planning will permit. This piece of equipment serves as a work station for the instructor, even though he finds little time to use it while teaching.

5. The planning center, the shop library, the filing cabinet, and the instructional area (including chalkboard and folding-chair storage cabinet) should be near the instructor's desk.

6. The major pieces of equipment should be lined up so as to provide open aisles from front to back and from side to side.

7. Main aisles leading to tool panel, supply cabinet, and main doorway should be at least 5 ft. wide when work areas are stationed on either side.

8. Normally, large machines should not be placed near the instructor's desk and the planning center.

9. Block off or fill up recessed spaces in the wall with cabinets or lockers.

10. Lockers of adequate capacity should be placed inside the shop either recessed in the walls or installed beneath the workbenches.

11. Machines commonly used in sequential order should be placed in the order of their operation.

12. Shop doors should open outward.

13. Each shop should have one large entrance with double doors so as to permit passage of large pieces of equipment; with an outside door of the overhead type in the area of power mechanics.

14. Avoid *squeeze areas* between machines and between wall and machines; that is, areas which are too narrow to serve as a safe passageway. Machines which are placed *back-to-back* should be installed in close proximity to each other so as to eliminate a possible *squeeze area*.

15. Arrange machinery for maximum safety, keeping in mind that students should not be stationed in line of danger.

16. Avoid an open-beam ceiling and whenever possible install acoustically treated material which will cover all ceilings.

17. Avoid the use of columns whenever possible.

18. Machines should be mounted upon felt or rubber *cushions* so as to reduce noise and vibration.

19. Partitions between shop and auxiliary rooms, excepting rooms used for *dead* storage of stock and equipment, should be equipped with visual panels of nonshatterable glass, extending upward from a height of approximately 42 in. from the floor.

20. All areas of the shop should be on one floor, thus eliminating the use of mezzanine floor areas, when one instructor is in charge.

21. The shop should be planned so that students will regularly use only one entrance.

22. Locate tool panels so as to avoid excessive travel.

23. Provide adequate storage for: (*a*) projects, (*b*) supplies, and (*c*) stock.

24. Benches and storage facilities should be large enough to accommodate standard sizes of material.

25. Fire extinguishers of the correct type should be readily available within the shop.

26. A well-equipped first aid kit should be readily available, either within the shop itself or in an adjacent office.

27. Since north light is desirable for exacting work, drafting rooms and graphic-arts areas should be located on the north side of the building whenever possible.

28. All machines should be controlled by a central control panel, located near the main entrance and equipped with flush lock.

29. A remote control throw-off switch, to control the master circuit, should be located within easy reach of the instructor's desk, at a height of approximately 6 ft. from the floor. In large shops, safety switches which are strategically located may be necessary to cut the power of all machines.

30. Locate all machines so that they can be used for processing the maximum size material which is normally required.

31. Appropriate dust collectors should be provided for surface grinders, sanding and buffing machines, circular saws, and other machines which tend to menace the health of students and teachers.

32. Appropriate exhausts should be provided to carry carbon monoxide fumes, gases, and other noxious and injurious elements out of the shop.

33. Provide metal containers and metal-clad storage cabinets for flammable materials.

34. Provide adequate space at the main entrance of the shop so that large classes can enter and leave the shop with a minimum of confusion and delay.

35. Install equipment or arrange lighting facilities so as to avoid the possibility of shadows falling upon working areas.

36. Avoid using the shop as a passageway to other rooms.

37. Do not have large amounts of lumber, supplies, and materials accessible to students.

38. Equip all dangerous machines with effective and approved guards.

39. Plan to use individual machines which are designed for specific functions and avoid the use of *combination* machines; such as, a combination unit which consists of a jointer, band saw, and circular saw.

40. Whenever possible, provide artificial lighting of the fluorescent or the shielded incandescent type which gives a minimum of 30 foot-candles of light on working surfaces and a minimum of 50 foot-candles on the tops of drafting tables. Consult a competent lighting engineer for details.

41. When space permits, an attractive display case should be installed in the shop.

42. Each shop should be provided with an adequate amount of chalkboard; possibly a minimum of 24 square feet.

43. Plan a shop that is completely and ideally equipped in its entirety, even though funds and equipment are not available immediately. This plan will then serve as a specific objective in setting up budgets through the ensuing years.

44. Shops should vary in size from 75 square feet per student to a possible maximum of 125 square feet, depending upon: (*a*) course which will be offered, (*b*) grade level of students, (*c*) size of class, and (*d*) extent of concentration desired.

45. Plan the shop so that it will be above grade level, keeping in mind that basement areas are most undesirable.

46. The floor should provide good traction and should meet the needs of the shop; avoiding concrete excepting in areas where specifications call for a fireproof floor.

47. In planning a shop, use scaled cardboard cutouts of all major pieces of equipment which can then be moved about freely on the scaled drawing; thereby making it possible to arrange innumerable layouts with a minimum of effort.

48. Facilities should be provided for showing movies and film strips in the instructional areas of the shop, or else, in a prepared room located within easy access of the shop.

49. Natural lighting areas should be equal to at least 20 per cent of the floor area; allowing additional area to compensate for glass blocks, etc.

50. Horizontal storage racks for lumber and metal bars should be designed to accommodate stock of normal maximum length of approximately 16 ft. However, vertical racks may be preferred for storing small amounts of lumber and metal.

51. Bases for cabinets and benches that have tops with little overhang should provide toe space for comfort of workers. The toe space also provides protection against floor brushes and mops, thus making it easy to maintain an attractive appearance in the shop.

52. Finishing room should be provided

Food merchandising at Dobbins Vocational-Technical School, Philadelphia, Pa. Submitted by Benjamin Novak

with explosion-proof lights and safety type exhaust fan.

53. A wash basin of two or three positions should be conveniently located near the main entrance.

54. All power machines should be permanently grounded.

55. Outlet for gluepot and remote control cutoff switch should be equipped with a red bull's eye pilot light.

56. Lines for all major power machines should be separately fused.

57. Shops which include activities in: (*a*) annealing, forging, welding, and heat-treatment of metals; (*b*) processing of plastics; and (*c*) steaming of wood prior to bending and molding should be equipped with approved pieces of heating equipment.

58. Tables used for finishing and gluing should be provided with metal tops.

59. All grinding machines should be equipped with localized lighting and safety type glass shields.

60. All major power equipment should be provided with overload type switches.

61. A working station should be provided for each pupil in the shop; with auxiliary station (any location in the shop where one may work) frequently equal in number to the working stations.

62. All belts should be carefully guarded.

63. Ducts for an exhaust system which is designed to remove dust and dirt should be installed beneath the floor; thereby eliminating undesirable and unsightly overhead installations and vertical ducts.

64. In order that an exhaust system may be compact and efficient, machines connected to it should be grouped as near the main unit as good planning will permit.

65. The shop should be provided with a drinking fountain, conveniently located near the washbasins. For reasons of sanitation, it should not be attached to the washbasins.

66. Adequate facilities for presenting an attractive project display should be provided in each shop.

Vocational Building of the Baker High School

L. W. HEFTIE
Superintendent of Schools

and

LEONARD HASKELL
Instructor
Baker High School
Baker, Mont.

Baker is in eastern Montana where farming and stock raising are important industries. Baker also is located on a natural-gas field. Several plants of the Montana-Dakota Utilities Company are located in or in the immediate vicinity of Baker. Baker High School draws students from families who are employed in industry as well as on farms and ranches.

Baker High School had been following the traditional academic program of studies which prepares students to enter college. A check of the school records and a follow-up of students who were graduated from Baker High showed that only 20 per cent of Baker students continued their education beyond high school.

The old shop building at Baker High

Vocational Building of the Baker (Montana) High School

School was built during the days when horses furnished the power on the farms and ranches. The building was limited in size, inconvenient, poorly lighted, and tools, machinery, and equipment were very meager. The only subject, woodwork, offered in the old shop was very inadequate for preparing boys to take jobs in the industries of Baker, or to find employment on motorized farms and ranches.

Something had to be done for the boys of Baker, Mont., to give them a more practical education. The percentage of dropouts was 6 per cent — an appalling number. The 80 per cent who terminated their education at the end of high school showed that to most of the students the wrong type of education was offered at Baker. And the per cent of dropouts indicated that many students were not interested in the type of education offered. Something had to be done.

The trustees realized that the curriculum of the Baker High School had to be revised to meet the needs of the students of the community. A new shop building was in order that would include a shop for instruction in trades and also for vocational agriculture. Work was started on a fine building in June, 1950. The building was completed and classes moved into their new quarters in November.

The vocational building of Baker High School is divided into two parts; one end of the building is given over to instruction in agriculture, and the remainder of the building for classes and shopwork in various trades.

The usual instruction in hand woodworking and machine woodworking is offered in the first two years of shopwork. After the introductory woodwork, a student may take a year of cabinetmaking or a year's course in carpentry. There are also classes in mechanical drawing I and II, two terms of architectural drafting, sheet-metal work, wood patternmaking, and one semester of electricity.

Agricultural students find carpentry a valuable subject for anyone who expects to live on a farm or ranch, and they come into the trade shop for such instruction. There is classwork in framing, rafter cutting, and roof construction. Each student frames and constructs a building in miniature, all the parts are one-eighth size. Then the building is actually constructed full size on the school campus under the supervision of the shop instructor. Such buildings as garages, brooder houses, and hog houses have been constructed by students of Baker High School. Buildings constructed by students are either used at home or sold by the student to meet the cost of material and are a worth-while profit to the student.

Boys in all four years of high school enter the trade-shop classes, and they take an active interest in the shop courses.

The shop instructor in Baker High School conducted a survey of the industries of Baker and of the graduates of Baker High School to determine the shop classes that are needed to fit students to take jobs in the community after their graduation. The result showed that in addition to the subjects already offered in the school shop, electricity and machine shop were needed.

Vocational agriculture has been offered in the Baker High School since the 1950–51 term. Three years of agriculture are taught which include courses in farm mechanics, crops, gardening, beef cattle, swine, sheep, poultry, landscaping, and farm bookkeeping. Each boy who is an agricultural student has a personal farm project that he works on his father's farm or ranch. Projects may include an acreage of wheat, the raising of a beef steer, raising sheep or poultry. The profit from the project is reinvested to give the boy a start in farming or ranching when he has completed school.

A local chapter of the Future Farmers of America, a national organization, has been organized at Baker, and all boys who are taking agriculture are members of the Baker chapter. The FFA Chapter purchased three registered gilts in the fall of 1951 which were put on farms of three FFA boys. The boys and the Chapter will share in the profits of the sponsored project which will be a continuous and revolving deal for all the boys interested in getting a start in livestock production for themselves.

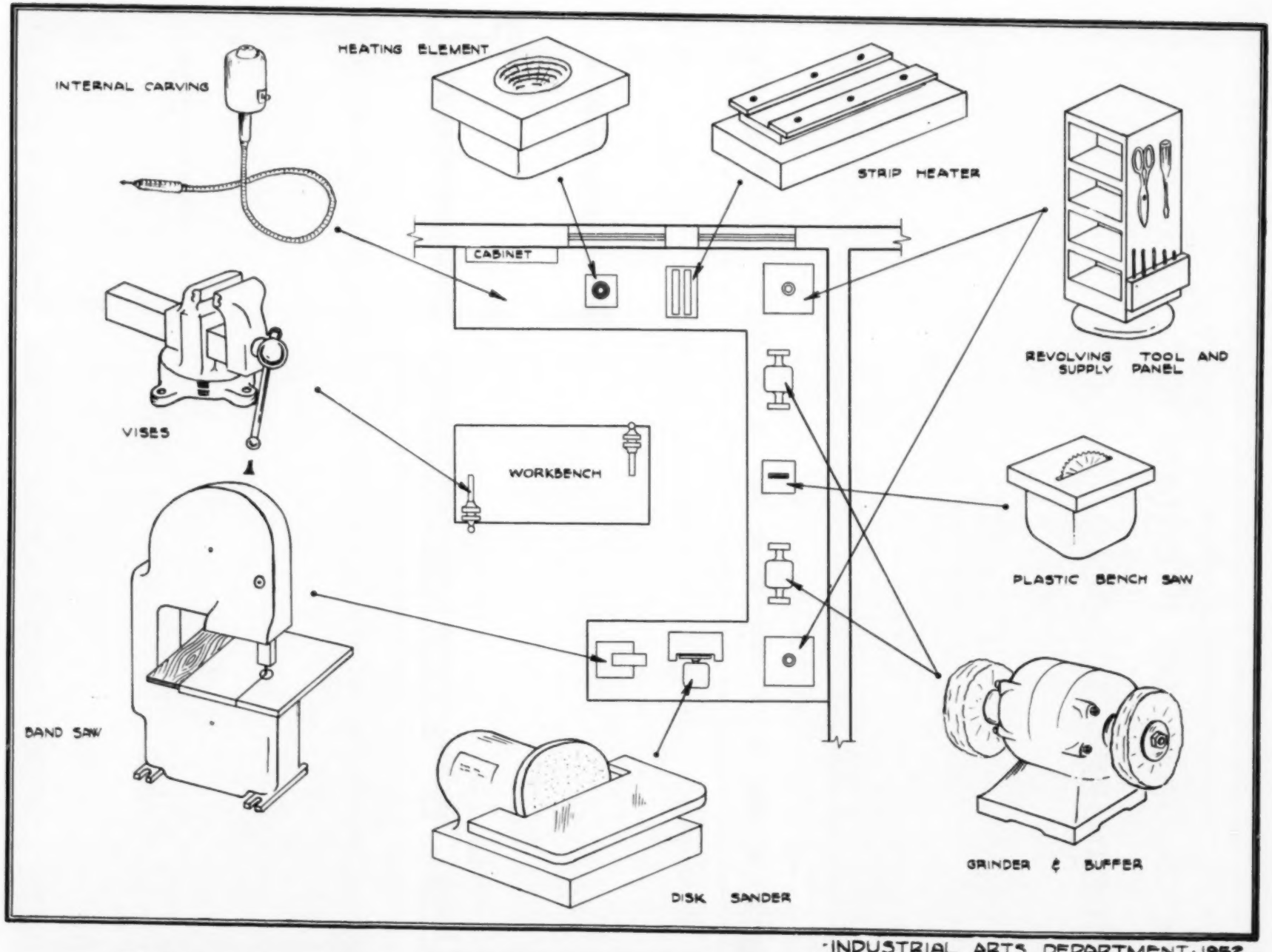
Since the construction of the new vocational building at Baker, the first two classes of agriculture students won highest honors in Montana with their judging teams. Each year the Baker boys won the district meet which permitted them to enter the state-wide competition at the Montana State College at Bozeman, Mont. Both years Baker took top honors in the state which entitled the judging team to compete at the national meet at Kansas City, Mo., in the fall of the year.

Since the vocational building has been added to the campus of the Baker High School, and with additional trade classes and agriculture to the high school curriculum, the percentage of *dropouts* is less than *one per cent*.

Motor-vehicle accidents caused the death of 5900 farm residents. Home accidents killed 3900 and injured 580,000. — *The National Safety Council.*

Airplane mechanic instruction at the Tucson Senior High School, Tucson, Ariz. Milton Mallis is the instructor

— Submitted by Harry A. Goldstein, instructor of photography



Plastic area in general shop. Geo. A. Willoughby, professor and department head, Michigan Normal College, Ypsilanti, Mich.

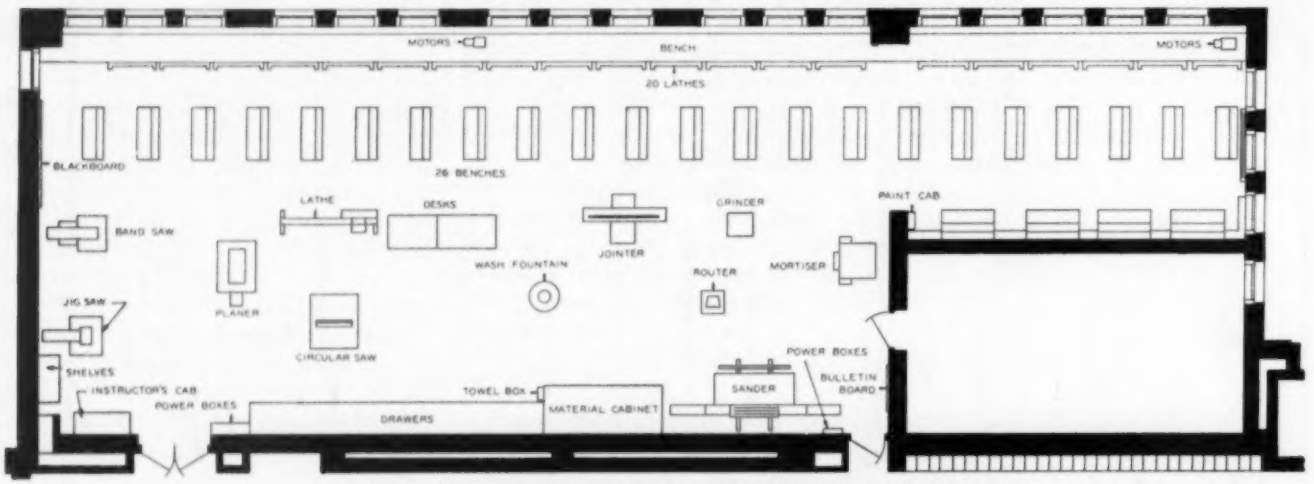
Modernization Program for Secondary Schools

ROY A. RADTKE
Director of Industrial Arts
Milwaukee, Wis.

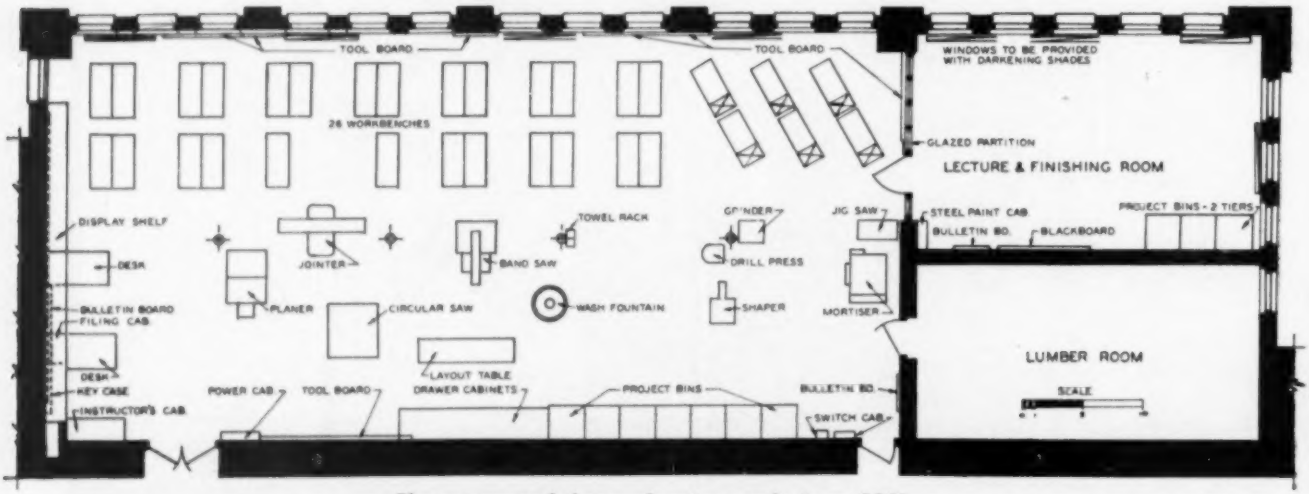
The secondary school, which has for the past twenty or more years received little attention, for reasons which are quite obvious, is again coming to the forefront. Higher birth rates, the expansion of the vocational school to meet war emergencies, the raising of the age limit for compulsory school attendance, the lowering of the age limit for those entering the military service, are all having their impact upon the importance of the secondary school. As a result, new schools are being planned and built, and old ones are being modernized.

About four years ago, the Milwaukee school board began setting up funds for remodeling secondary schools. After these funds were made available, the industrial-arts department began a long range program for modernizing its departments in these older schools. Unfortunately, some of these schools because of structural difficulties and academic requirements, did not lend themselves readily to the shop-expansion programs, and consequently the best one could hope for was to improve the shop area that was available.

The plans and pictures which accom-



The old arrangement — drawing made November, 1952



The rearranged shop — drawing made June, 1951

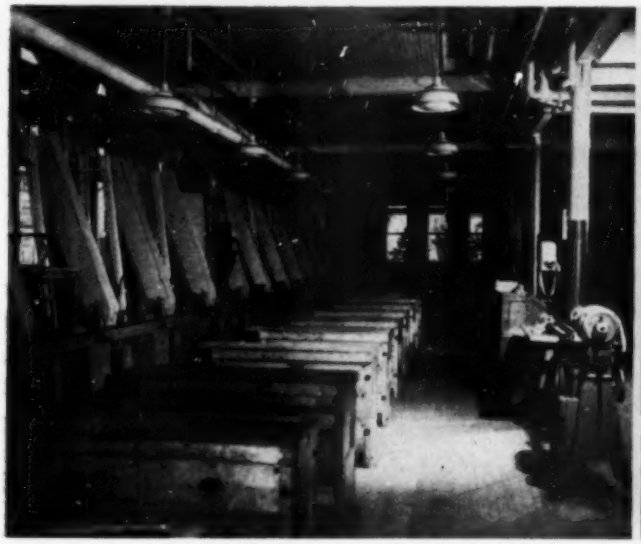
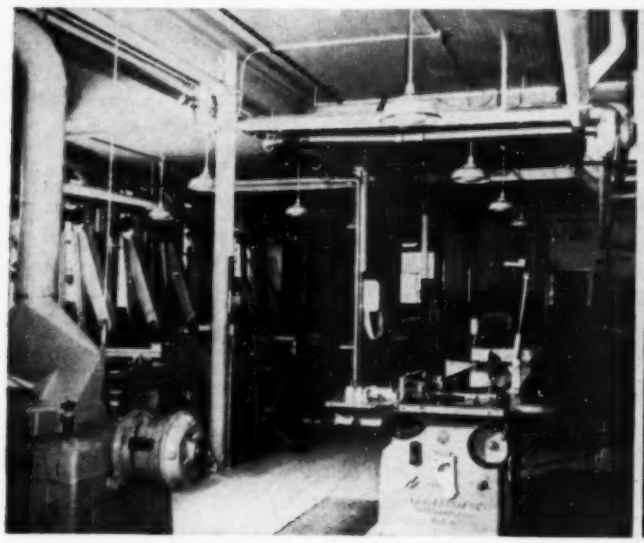


Fig. 1. Cabinet shop before alterations. Fig. 2. (at right) – Same view after alterations

pany this article are for the South Division High School. South Division is an academic high school, typical of those found elsewhere throughout the nation. Its two shops and one mechanical drafting room are evidence of another era. A look at the pictures and drawing will emphasize this point. Wood turning, as such, was discontinued many years ago, but the pictures and drawing show a long line of belt-driven lathes with line shaft enclosed and countershafting mounted to the ceiling. This battery of lathes was driven by two motors. Also note the belt guards obstructing the light from the windows. These guards were installed at the request of the Industrial Commission; but while they may have provided some measure of safety to the student, they certainly obstructed the light and created other hazards. These lathes have been removed and replaced with six modern individual-driven lathes. Figures 1 and 2.

One could go over each item — such as the single row of benches extending the full length of the shop; the location of the band saw next to the blackboard; the large lathe in the middle of the floor; the jig saw near the bulletin board; and thus point out the poor arrangement and ineffective teaching situation. However, it isn't the past arrangement with which we are so concerned but the alterations that have been made to improve the conditions. An inspection of the two drawings and a look at the pictures will indicate how well these improvements have been carried out.

While this may seem in reverse order, the drawing dated November, 1952, is a layout of the room before alterations were started. The drawing of June, 1951, with specifications, was prepared in the industrial-arts office and submitted to the building department, and the changes made according to the plan submitted. While the arrangements for the circular saw, jointer, planer, and band saw are not unusual, they are concentrated in a smaller area and permit the instructor to place himself in such a position that he can observe students working on the machines, and at



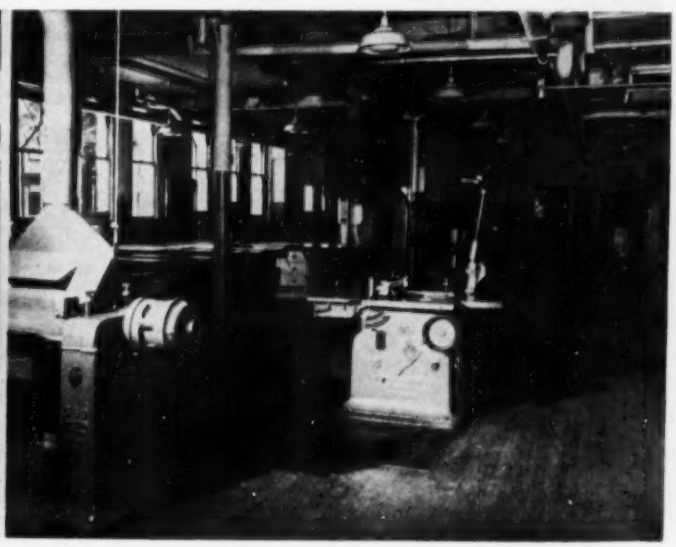


Fig. 3. Another view of the same shop. Fig. 4. (at right) – The same view after alterations had been completed

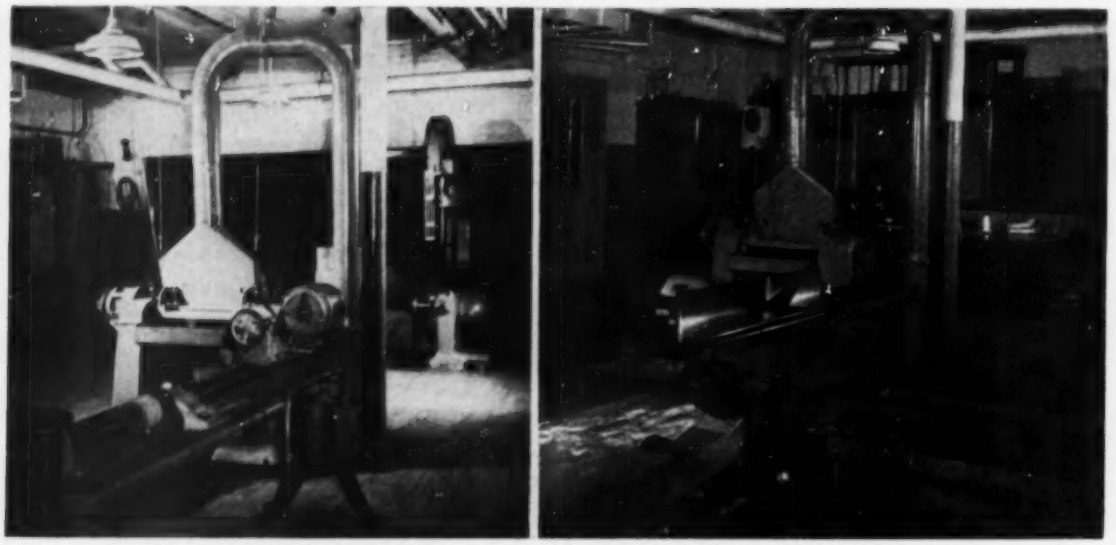


Fig. 5. Original shop looking toward the south. Fig. 6. (at right) — The same view with some of the machines removed or relocated

the same time retain supervision over the rest of the class.

Some prefer to have the circular saw in the position where the jointer is shown, but to do this would have meant moving an additional machine and added expense. The planer and the circular saw were already in position, and thus it required moving the jointer only.

One other feature of this shop arrangement is also worth mentioning. In spite of the four pillars going down through the center part of the shop, there are no blind spots in this new arrangement. The teacher can observe his class from all points of the room.

Storage, one of the most neglected requirements of most industrial-arts departments, is amply provided for in the project bins shown in the finishing room and along the east wall. Finishing, which formerly had to be done in the open, is now done in an enclosed room. Of course, modern finishes have helped to eliminate many of the difficulties one had with the older type products. It will also be observed that the north end of this shop has been turned into a finishing and lecture room. Darkening shades on the windows, a chalkboard, screen, outlets, and chairs, permit the showing of motion pictures or slide films.

The accompanying pictures, which show the before-and-after effect, are tangible evidence of the changes that have been made in this particular shop. While the alterations in the woodworking shop have been completed, the metal shop is also undergoing changes at the present time. When completed, it too will be a modern and up-to-date general shop, equipped to meet the requirements of present and future needs.

In addition to the alterations now nearing completion at South Division, three other schools are on the schedule for changes in 1953, while one other has already been completed.

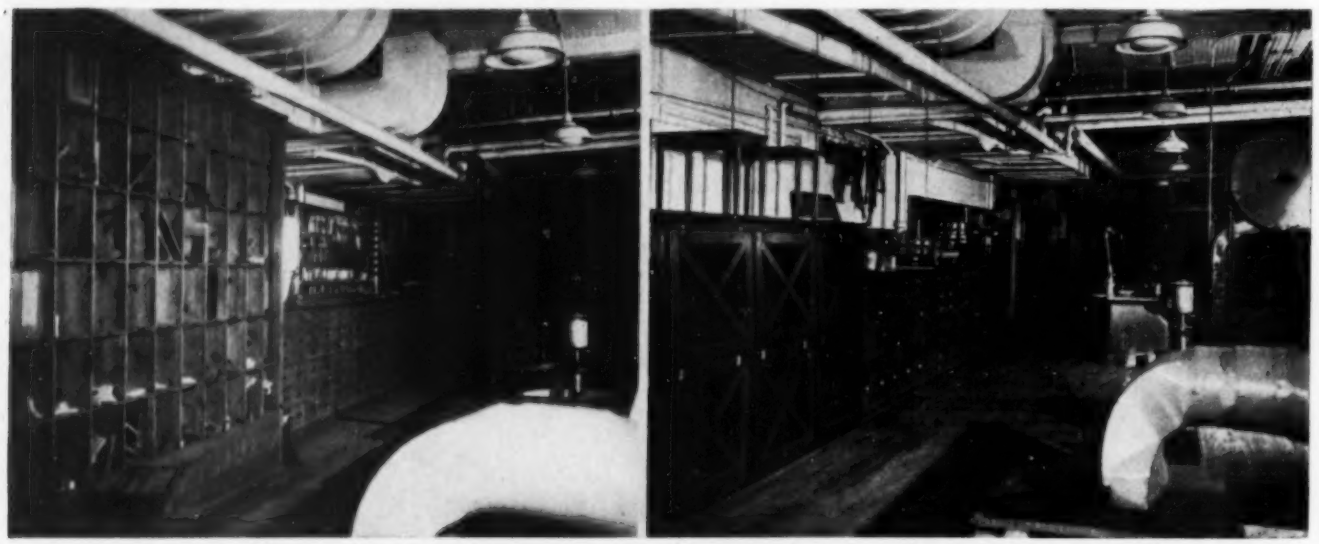


Fig. 7. Looking at old storage bins, and tool board mounted above cabinet. Fig. 8. (at right) — The same position after the new project bins had been installed

Vocational High School at Winfield, Kansas

JUANITA REYNOLDS
Winfield, Kans.

A building to serve the needs of the community was the predominant idea for the new vocational high school at Winfield, Kans. It should provide training for the vocational and avocational needs of the boys and girls, and men and women living within the area easily accessible to Winfield.

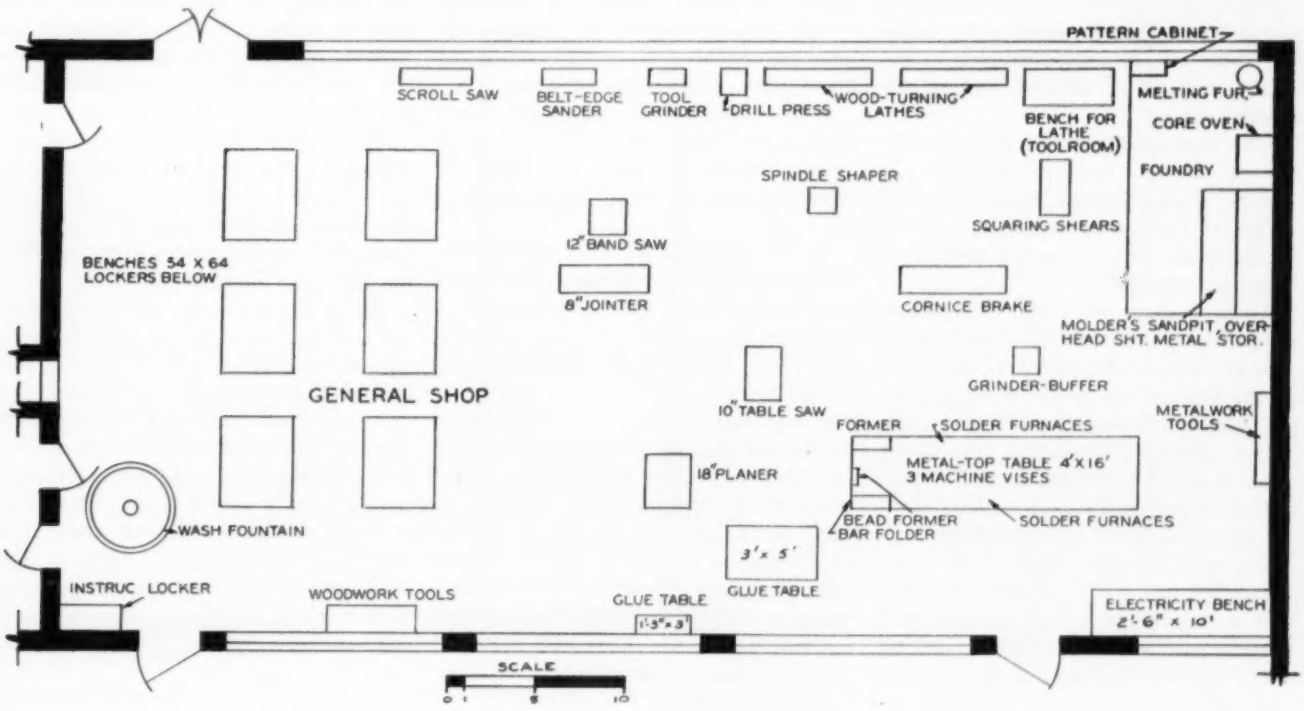
Occupations of the community were given consideration. An enlarged industrial-arts department seemed necessary. Proximity to the airplane factories of Wichita has increased the needs for training in related fields; while nearby oil fields have jobs for those with industrial skills. Since Winfield is in the midst of an agricultural area, a well-equipped farm shop also was essential.

To further serve the community, two local colleges will be permitted to use the building's facilities, and consequently will be able to expand their vocational education offerings. Schools of small towns nearby will be welcome to organize and bring classes regularly to take advantage of this enlarged field of instruction. Adult education classes have long been on the agenda; now they will be increased in number. Girls and women will be admitted to classes as the need or demand grows.

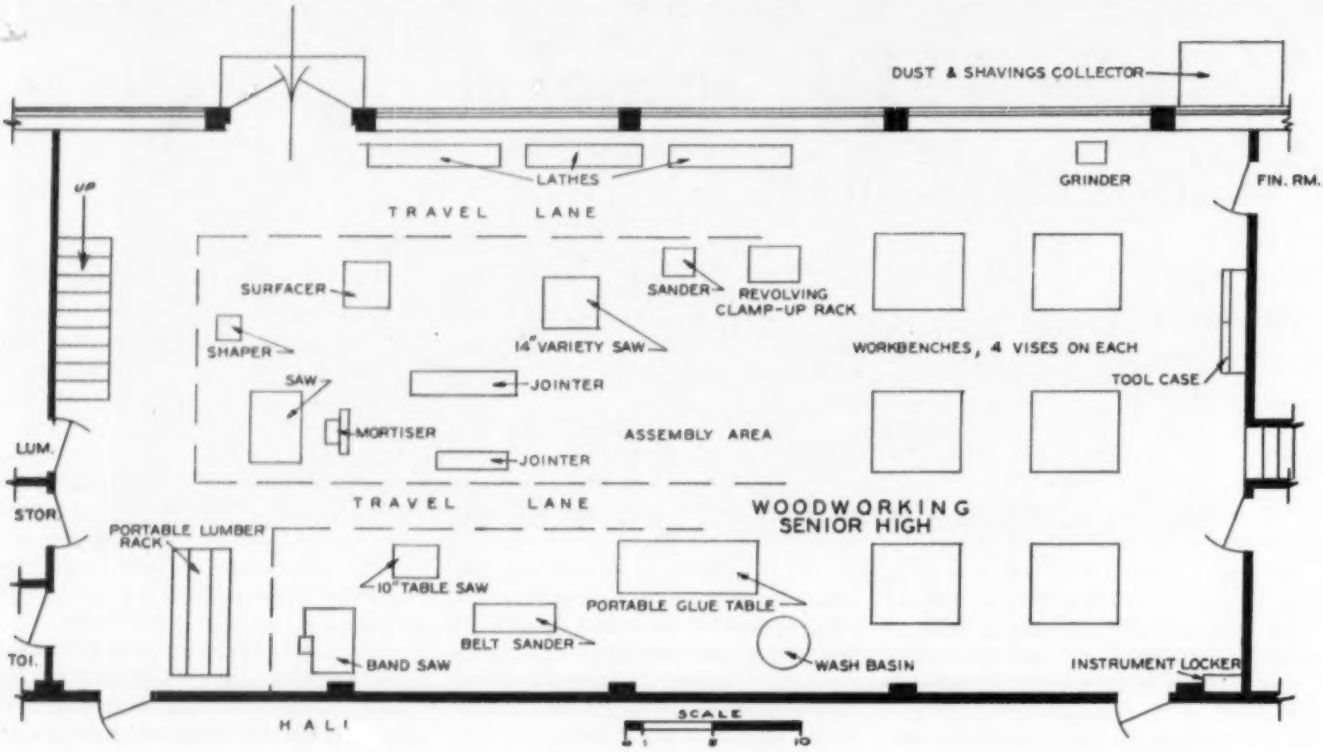
The first definite plans for this building were made in 1940. Bonds to the extent of $325,000 were voted, and later another $195,000 were added. World War II delayed actual work, but by the time the structure was finally begun it was one half paid for. Estimated cost is $566,000. It is figured that these 50,000 square feet of building average approximately $10 per square foot.

Equipment is valued at $50,000. Some machinery has been purchased during the years following World War II, some war surplus equipment was acquired, and when possible some has been constructed in the old school shops of the present high school.

The new building will have an exterior facing of limestone rock, quarried a few miles from town. A steel framework supports the tile roof; while the floating walls are constructed of pumice block. These floating walls will allow the minimum of reconstruction at such future time when it is deemed necessary to rearrange shops or classrooms.



General-shop layout



Layout for woodworking shop

An abundance of glass windows and panels as well as corrugated green Plexiglas in the roof assures the maximum use of natural light. Classrooms will have fluorescent lighting, and the lights in the finishing room will be explosion-proof. Green panes are used in windows that receive strong sunlight.

Unit heating permits each shop to make use of its own auxiliary overhead gas heaters. Thus there may be only one shop in use at night, and its heating will not be dependent upon the central steam heat which is normally used.

To gain the greatest use of the available grounds, an *E*-shaped building was planned. The space was concentrated in the center of the block where it leaves ample room for possible driveways, loading docks, and a large courtyard which will be used for outdoor school gatherings, as well as such outdoor construction as the building of garages or repair of heavy machinery.

Basically, this is a one story structure; but it has two story characteristics. The foot of the *E* is the front or main entrance wing of the building. It is this section which contains the double-deck or mezzanine floor. An entrance at the right end provides entry for students coming from the adjacent high school. Likewise, they may proceed to the mezzanine floor from this entrance.

While an entrance at the center left brings the visitor promptly to the office of the superintendent of city schools, the principal of the vocational high school, and the director of elementary education.

Once inside, the visitor may walk through the halls, and watch any of the various classes or shops in session as glass partitions rise above the 5-foot glazed tile walls.

At the foot of the *E* is the industrial-arts department. An understanding of electricity becomes more necessary each year, so a radio-electricity room has been provided. The room, 32 by 70 feet, has a capacity for 24 students. Machines are located in the west end of the room; workbenches in the east end. Each workbench has been provided with outlets carrying four different currents. A master panel will control each outlet, and give practice in the use of alternating and direct current. Above the outlet panel a booth has been installed where students may practice electrical procedures, such as the wiring of a house.

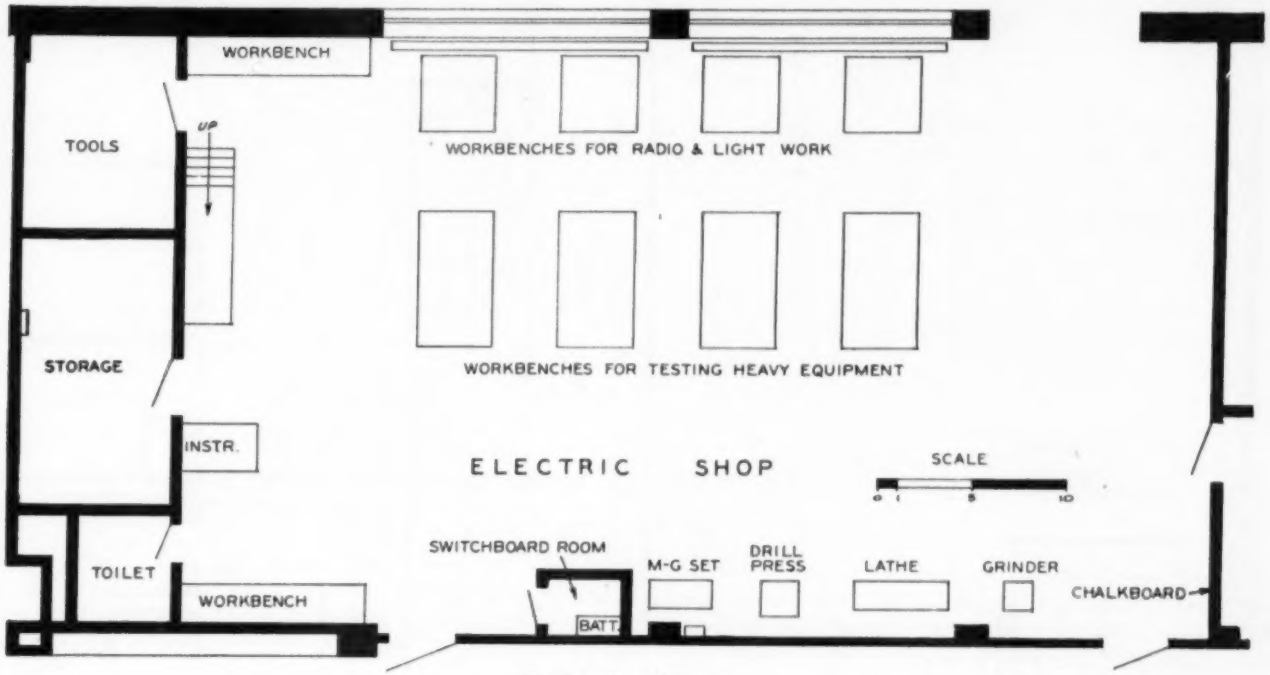
Every effort has been made to take advantage of potential lost space. Since the roof is high, to accommodate the mezzanine floor which is located over the classrooms on the south, the shops, on the north, have taken advantage of the space upward. It will be noted that throughout the building small rooms have been located between shops, and these have individual lowered ceilings. Thus areas above these are made accessible by individual stairs, and in most instances are used for storage.

Natural light, filtering in from the green Plexiglas in the slanting roof and from the glass windows of the north wall, enters the two mezzanine rooms by way of the glass wall which provides insulation from the sounds of machinery below.

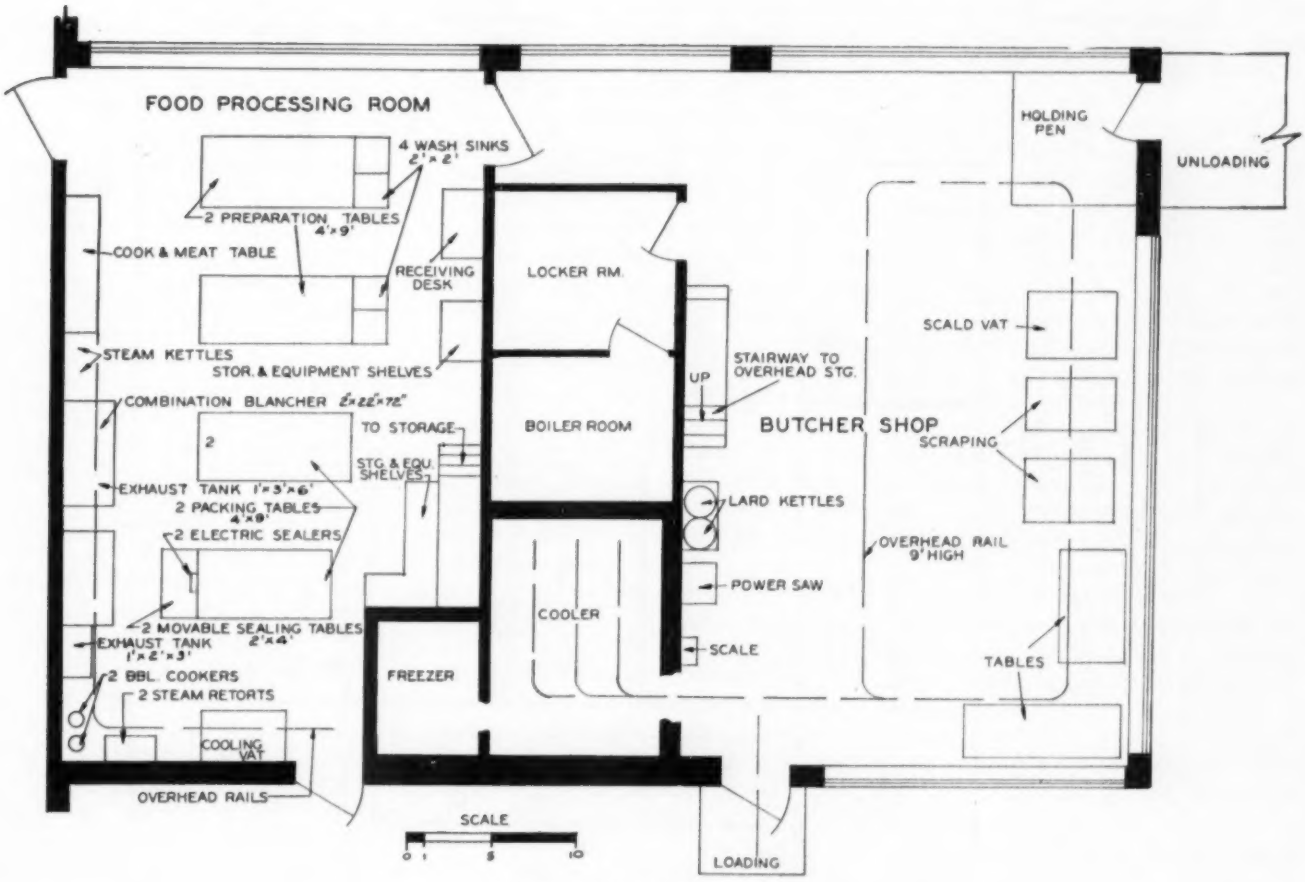
The junior high shop offers exploratory work in the five fields of metal, wood, electricity, plastics, and foundry. It will have such equipment as metal lathe, rivet guns, sheet-metal shears, box brake, other sheet-metal equipment, and a furnace. It will also have equipment for working wood, plastics, and hot metal.

More advanced pupils will work in the unit type senior high shops. Here for them to master are courses in radio, electricity, broadcasting, carpentry, machine shop, cabinetmaking, drafting, crafts, and graphic arts.

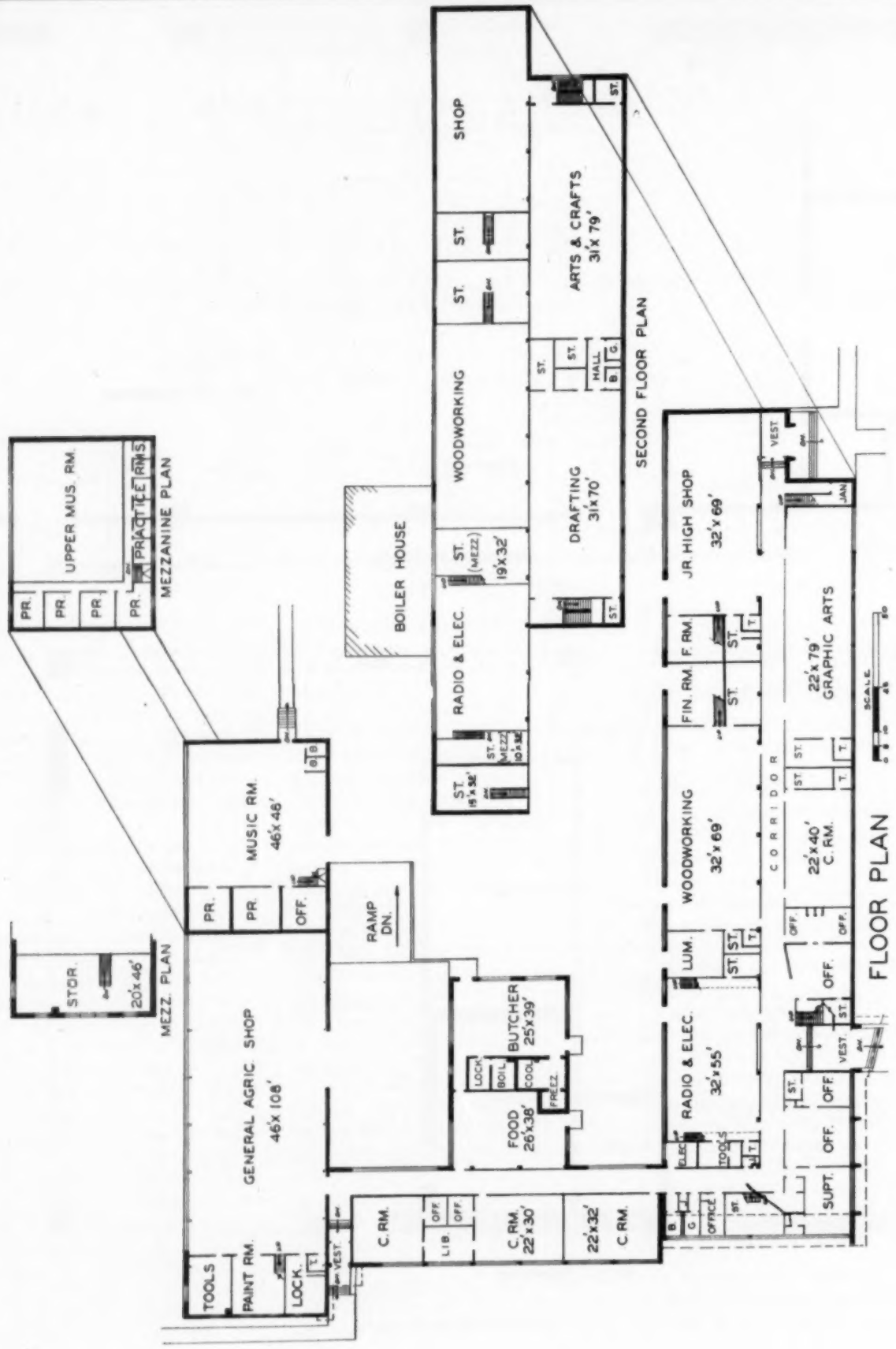
A feature of the advanced woodwork room is the Rotoclone dust collector. In the floor by such machines as the planer



Electric-shop layout



Layout for foods room


MEZZANINE PLAN
UPPER MUS. RM.
PRACTICE RMS.
PR.
PR.
PR.
PR.
MEZZ. PLAN
STOR.
20'x 46'
MUSIC RM.
46'x 46'
PR.
PR.
OFF.
RAMP DN.
GENERAL AGRIC. SHOP
46'x 108'
TOOLS
PAINT RM.
LOCK.
VEST.
C. RM.
OFF.
LIB.
OFF.
C. RM.
22'x 30'
22'x 32'
C. RM.
BUTCHER
25'x 39'
LOCK
BOIL
COOL
FREEZ.
FOOD
26'x 38'
BOILER HOUSE
WOODWORKING
SHOP
ST.
ST.
ST.
ARTS & CRAFTS
31'x 79'
ST.
ST.
HALL
G
B
RADIO & ELEC
ST. (MEZZ)
19'x 32'
DRAFTING
31'x 70'
ST.
ST.
MEZZ
10'x 32'
ST.
15'x 32'
SECOND FLOOR PLAN
JR. HIGH SHOP
32'x 69'
VEST
JAN
F. RM.
FIN. RM.
ST.
ST.
T
22'x 79'
GRAPHIC ARTS
CORRIDOR
WOODWORKING
32'x 69'
LUM.
ST.
ST.
T
22'x 40'
C. RM.
OFF.
OFF.
ST.
T
RADIO & ELEC.
32'x 55'
ELEC.
TOOLS
T
OFF.
OFF.
ST.
VEST
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SUPT.
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OFFICE
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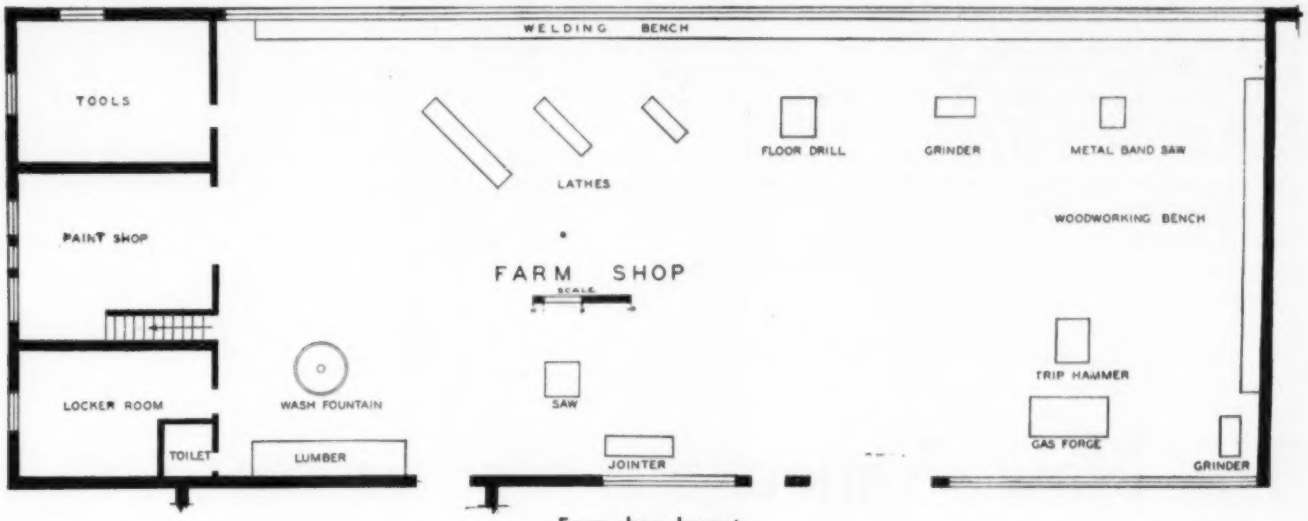
FLOOR PLAN
SCALE



Farm-shop layout

and the jointer are 8-in. suction tubes leading to the dust collector which has a capacity of 5500 cubic feet of air per minute. The dust is carried outside into the air, while shavings will go into a hopper outside the building for collection and disposal.

In this, as in each of the other shops, is a large, round, clean-up fountain, controlled by foot. Twelve boys will be able to use it at one time. Also in any shop if the instructor finds it necessary to leave the shop during class time he may as a safety precaution choose to stop all machines. This he can do from the master panel in his shop.

A freight carload of lumber can be stored on the four steel racks in the lumber room. From there it is taken out on a portable rack.

A door in the north wall has been provided for any large equipment which may be brought in for painting. In each of the finishing rooms, a metal spray booth has a 21-in. exhaust fan to carry off fumes. They also contain turntables. The junior high room is slightly smaller.

Graphic arts is located in one large room. Provision here is for the linotype, job press, platework, book binding, photography, and making of cuts.

Trophy and display cases are recessed into the hall walls. A future library and conference room also is located in this wing.

On moving north to the center wing of the *E*, one passes more classrooms. This center wing, the foods processing unit, is destined to be increasingly popular as its possibilities are realized by the community. An unloading dock at the east permits entry of animals into the meats room for slaughter. Procedure is so organized that the carcass is moved in a semicircle of preparatory stages to the refrigerator rooms. A rolling hoist will carry the beef or hog into the chill room or deep freeze room or to the out dock on the south. Capacities for the chill room are 12 beef, and an equal number of hogs. Other features of the room include overhead scales, two killing stations, kettles for rendering lard, a power saw, scalding vats, tile floor, and storage area over the refrigerator rooms.

The unloading dock of the meats room may be used for the entry of produce for the foods processing room. Like the meats room, fruits or vegetables to be processed for freezing or tin or glass canning will be moved along in the logical line of procedures. Facilities will include wash tables, preparation tables, a series of pressure cookers, ranging in size from 20 to 100 can capacity, steam kettle for catsup making, open cookers for fruits, and a cold water vat. This room also has an exit dock.

To proceed toward the upper wing of the *E*, the visitor passes classrooms, offices for instructors, a library, and a room for the officers of the Future Farmers of America. An outside entrance provides access from the west side of the building. In the hall near this entry, a gate can be locked in order to bar entry to one or the other wings. The hall proceeds to the farm shop.

The farm shop may also be entered from a court, in the upper part of the *E*. The courtyard is graveled at present, but will be surfaced eventually. When there is a surplus of projects they will be left in this area. Bins have been placed along the shop wall for the collection of scrap iron, and next to these are cupboards built to hold acetylene and oxygen tanks. As a safety feature the acetylene and oxygen will be piped from these tanks under the shop floor to the stations for use.

Large doors for entry of machinery lead from the courtyard into the 48 by 128-ft. shop. The height of which is 18 ft. to the eaves.

The application of power to farm work was the thought and purpose in the planning of this shop. Equipment has been carefully arranged to co-ordinate work. Machines are set to the outer sides of the room, leaving the center clear, for potential use as a ring for livestock shows.

Some of the equipment includes a trip hammer, which has a 15-ft. foundation to absorb vibrations; two blacksmith forges, with self hoods, a floor drill for steel work; three metal lathes, a power hack saw, jointer, overarm saw, metal cutting band saw, and a grinder.

Along the north wall is the section for all metalwork. There are 18 stations for acetylene welding and 9 stations for arc welding. Here also is located the 96-ft. all metal workbench which extends only 22 in. from the wall. Equipment and welding tables, when not in use, are stored under this bench.

Above the bench are metal-back frames alternately colored green, yellow, or red. Each tool will be mounted on the

place indicated by its shape. It is planned that a student should not have to walk more than three feet for any tool.

The electric traveling crane, weighing five ton, with a capacity of ten ton, is expected to provide for all present and future capacity of the shop. It can handle a tractor, a pickup, or baler, or carry steel to the storage area above the small rooms at the end of the shop.

One of these areas is a parts room, which also contains the universal grinder, as well as the units that supply the radiant heating system in the shop floors. Another is a washroom with steam cleaning facilities for use on tractors; and a large exhaust fan for use during painting of equipment.

Next is an ample locker-shower room. On the wall by the outside door are master switches for control of all power, lights, and equipment. On the other side of the east wall of the farm shop and actually a part of the *E* structure is the music hall. However, it functions autonomously, and has its entrance from the east.

Giant elm trees surround the building; they were carefully protected during all stages of construction, so that even now, this building has that air of belonging, which usually only time can bestow.

The New Agricultural Unit at the New Richmond High School

ROBERT G. HEEBINK
Instructor in Agriculture
High School
New Richmond, Wis.

To meet the needs of the agricultural youth preparing for farming and to aid those already engaged in the vocation of farming, the board of education of New Richmond saw fit to provide a complete agricultural unit for these groups. The largest item of expense and the biggest investment on most farms in this area is their machinery and equipment. One report from the College of Agriculture at Madison states that on a modern dairy farm in Wisconsin the investment averages over $8,500. So as to be better able to protect such an investment modern educational facilities are provided to train the rural youth in the care, adjustment, and servicing of the farm machines they will operate in the future. With that thought in mind, this building was designed, built, and outfitted.

This building is used by four specific groups, all closely associated with the business of farming. The largest and most important is the rural youth enrolled in day classes; the veterans, enrolled in the *on the farm training classes;* the young farmers in the community that are out of high school are enrolled in *young farmer evening classes;* and the older farmers are enrolled in *adult farmer evening classes.*

The new agricultural unit at the New Richmond High School — Architect, Raymond Le Vee and Associates, Appleton, Wis.
(All photos by F. J. Van Someren, Baldwin, Wis.)

The 36 by 84-ft. building is divided into five rooms. The largest room is the farm shops room; it has a floor space of approximately 2000 sq. ft. There is also a classroom, agricultural laboratory, office, and toilet facilities. The floor plan of the entire building is shown on the accompanying sketch.

The Farm Shop

The farm shop was designed to include four specific areas: woodworking, metalworking, welding, and repairs. The school also has a very complete industrial-arts department. The shop was laid out so that it could serve as a model which farmers could follow on their own land. The stationary equipment and the hand tools are of the same type as those in a shop on the farm. Larger pieces of equipment in the shop are a table saw, electric arc welder, drill press, portable drill, heavy duty grinder, and two bench grinders. Other stationary equipment to be added later will be another electric arc welder, and possibly a band saw. Because of the small amount of wall space and the large amount of window space, all of the hand tools are stored on portable tool racks. They can be moved to any part of the

Assembling a new manure spreader

shops so that the tools needed are very accessible. Another thought carried out in designing this shop was to have as much clear floor space as possible. Because of that the workbenches were placed along the north and south walls. The benches were designed so that the floor would be clear up to the walls. This makes for additional floor space and permits easier sweeping of the shop floor. A picture showing a section of the workbenches on the north side of the shop is also included. The diagonal leg supports provide space for lumber and metal storage. The large amount of floor space is needed because of the type of work done in this shop. In an industrial-arts shop the project the student works on is usually rather small in regards to floor space needed, but in the farm shop the projects are usually much larger, and tractors and other farm implements can be brought in for repairs. Another feature of this shop is the 10 by 14-ft. overhead door in the east wall of the building. This allows machines as big as a combine to enter the shop.

Workbenches arranged along the wall

Making repairs in the new shop

Curriculum Offered

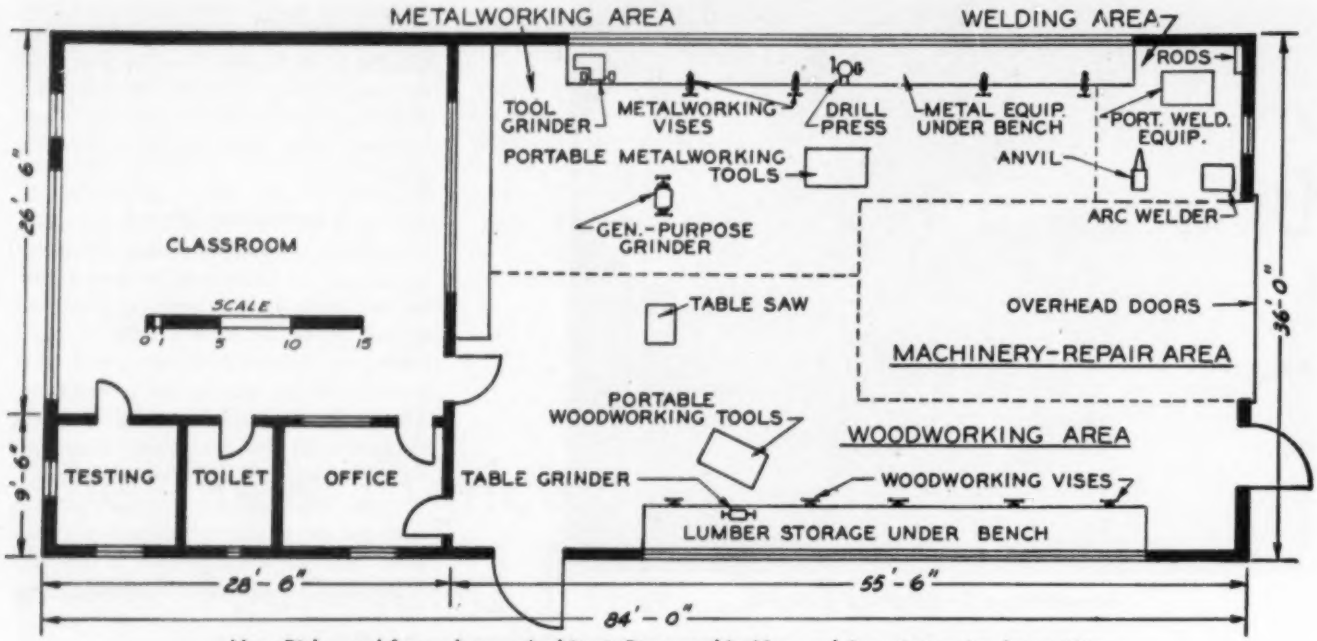
It should be understood that this building is used for more than farm mechanics instruction. A 4-year course of vocational agriculture should include units in plant husbandry, animal husbandry, and farm management as well as farm mechanics. This article deals mainly with the farm mechanics, for that reason only the course offered in farm mechanics will be discussed.

In the freshman year the main purpose is to get the student acquainted with the shop. Only one month is spent in the shop, during which time students are taught shop safety, shop routine, rope work, and some farm carpentry. The students are required to make some simple woodworking project that is useful on the farm.

The sophomores in Ag. II spend about two months in the shop. Shop safety is reviewed. They are also instructed in tool sharpening, cold-metal work, sheet-metal work, farm plumbing, farm water supply, land survey, and land measurement.

The Ag. III course includes arc welding, farm machinery, and farm structures. These units require about 16 weeks to cover them satisfactorily.

The Ag. IV curriculum requires approximately 12 weeks for completion. Instruc-



New Richmond farm shop — Architect, Raymond Le Vee and Associates, Appleton, Wis.

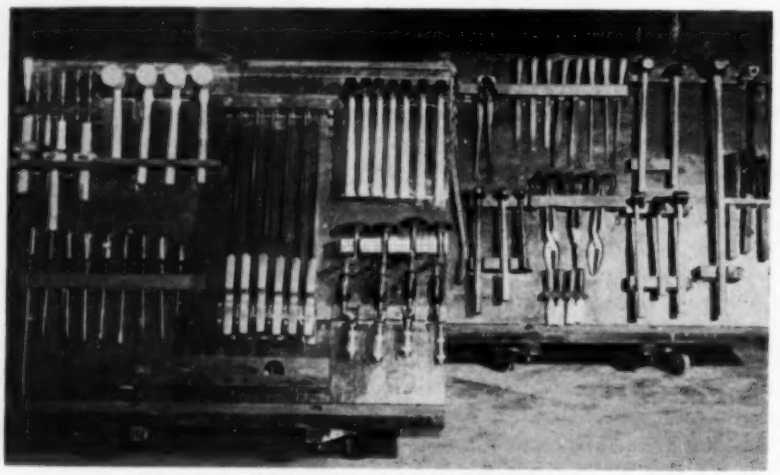
tion is given in farm electrification, farm tractors, and home shop planning.

There also is a class of junior and senior farm girls enrolled in an agricultural class for girls. They are offered the same course as the regular freshman students.

The local machinery dealers are very co-operative in assisting with the farm machinery courses. Technical help is given to accompany the various farm tractors and implements used by the boys in their classes. Courses given in farm machinery and tractors acquaint the student with the information that the farmer should have in order that he be able to adjust, service, and maintain his equipment. Major overhauling, especially on farm tractors, is not attempted; that is believed to be a serviceman's job.

It was mentioned previously that the school also has a very complete industrial-arts department. There is very little duplication between the industrial-arts courses, and those offered in the agricultural department. The two departments co-operate, however, in exchanging equipment and assistance.

In summarizing the curriculum offered it might be said that this department attempts to give the student the knowledge and skills which the farmer must have to operate his farm equipment properly, and keep it in repair.



The portable tool rack for woodworking

Co-operative Efforts

A very fine example of co-operative effort has been demonstrated in the completion of our agricultural building. The high school students assumed the task of completing the interior of the building. Senior students assisted in designing the portable tool racks and the workbenches. All of the classes joined in painting the interior, installing stationary equipment, building workbenches, tool racks, bookshelves, and the cabinets needed for the classroom and laboratory. As a result of their efforts the students now feel that the building is theirs, they have the pride of ownership, and there are no signs of the usual vandalism so often found in public school buildings.

Portable Tool Racks

The portable tool racks used by this department have created much interest. They have proved to be very satisfactory. Three racks are used, one for woodworking tools, one for metalworking tools, and the third for welding tools. Each tool has a definite place, and the students learn quickly that each tool must be returned to its own place. This system makes it very easy to check on the hand tools, and so far no tools have been lost.

A Conversion Job in the Bloomfield Junior High School

ARTHUR A. BACHMAN
Industrial Arts Instructor
Junior High School
Bloomfield, N. J.

The curriculum development committee studied the facilities of our industrial-arts rooms and came to the conclusion that, if the program which they felt should be instituted in the junior high school was to be implemented, we needed an additional shop. Several years ago the county school system radically revised its entrance requirements. Consequently, many boys who in the ordinary course of events would have left junior high school at the end of the eighth grade in order to study special trades and skills, now stay here through grade nine. This situation has been discussed for several years. At the time the curriculum development committee was studying the area of related arts, the writer was invited to give them the conclusions which had been reached and the thinking which we had done in order to provide a more adequate program for our ninth-grade boys. As a result the curriculum development committee recommended the following:

1. All boys should have common experiences during the first two years with the opportunity provided for as many girls as possible during this time, on an interest basis.

2. There should be further exploration of the cycle core in conjunction with the art workshop and homemaking laboratories.

3. Provision should be made during the third year for concentration on an interest and need basis for more pupils in a larger time block.[1]

As an outgrowth of the discussion with the curriculum development committee, the problem was still further explored in discussions with Henry T. Hollingsworth, superintendent of the Bloomfield public schools, and with several principals of the county vocational schools. We came to the conclusion that, in order to implement the suggestion of the curriculum development committee, it was necessary to establish a general craft shop or small tool shop. This type of shop would serve the needs of the younger boys, thus freeing our present

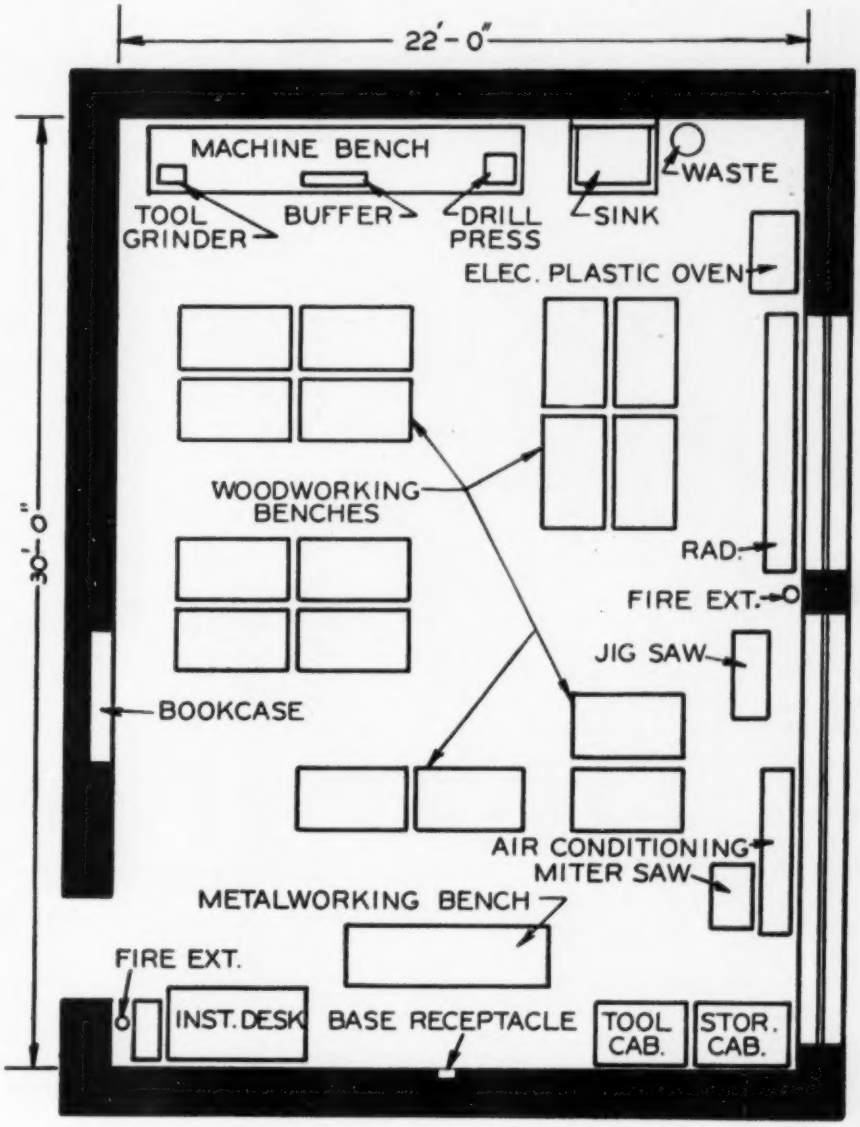


Fig. 1

[1]Curriculum Plan, Bloomfield Junior High School, 1952, p. 49.

heavy machinery and space in the general shop for the ninth graders.

Dr. Skogsberg, principal of the Bloomfield Junior High School, suggested that the possibility of using the garage or the bicycle room or some other room for this new shop be thoroughly investigated. Accordingly, David Williams and William Demarest were appointed to assist in making a careful study of the problem.

Utilizing the garage would have entailed a considerable expenditure of money because it needed thorough reconditioning and rebuilding, a separate heating plant or connections with the main heating plant, as well as water and gas and electrical connections would have had to be made. This expense was considered prohibitive.

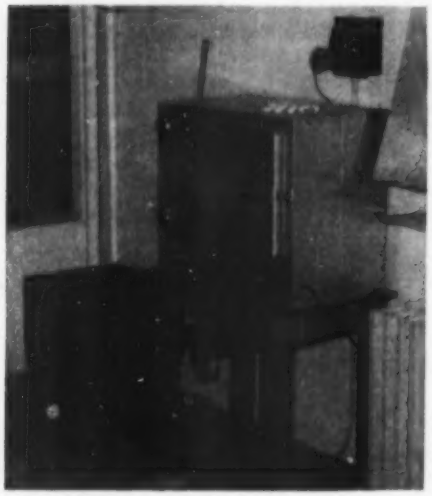


Fig. 4. An electric oven

The bicycle room would have required special lighting and a ventilating system. Also the head room was not sufficiently great because of the pipes and ventilating ducts that run through this room. Additional heating facilities also were needed. In addition, it would have required a different place for storing the bicycles and would have done away with the laundry facilities for the homemaking department.

The present mechanical drawing room, because of its size, lighting facilities, and existing installations would have provided ideal shop space. However, another room to give mechanical drawing comparable facilities would have been needed.

We finally concluded that room 11 was the best available. It is a well constructed room having an eastern exposure and one built-in closet. It is located near the present mechanical drawing room and general shop. It is convenient to storage space, and the installation of the necessary electrical outlets and water connections could be made easily. The expense of equipping room 11 was therefore the most economical of the existing possibilities. During this investigation frequent consultations were had with Albert Koehler, supervisor of industrial arts of the Bloomfield public schools, whose advice and assistance was invaluable.

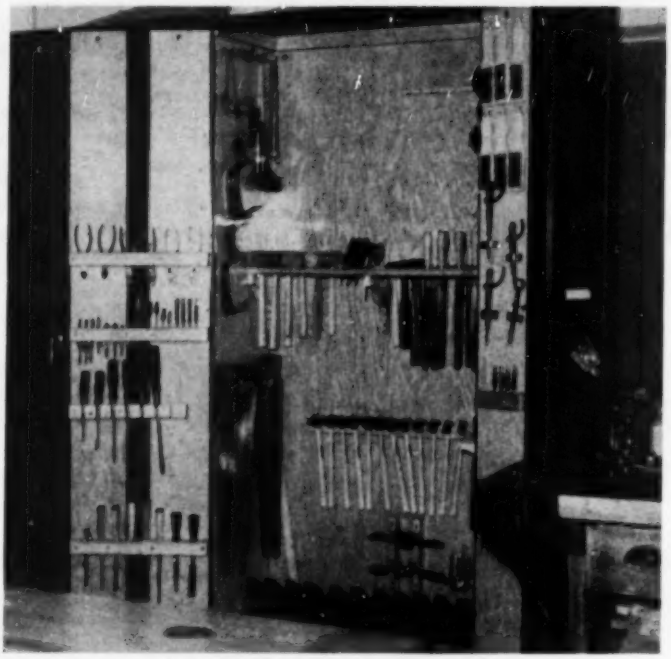


Fig. 2. The new tool cabinet

The report was submitted to Dr. Skogsberg. He then asked the writer to prepare a layout of the room, and to make an estimate on the cost of materials, machinery, and whatever was necessary to set up this shop in room 11. One requirement laid down in making such estimates was that, as far as possible, we utilize existing equipment such as the workbenches which were stored after having been discarded by the elementary schools. The new layout is shown in Figure 1. The arrangement of the benches was decided upon during the time of actual installation. The present arrangement was arrived at on the basis of

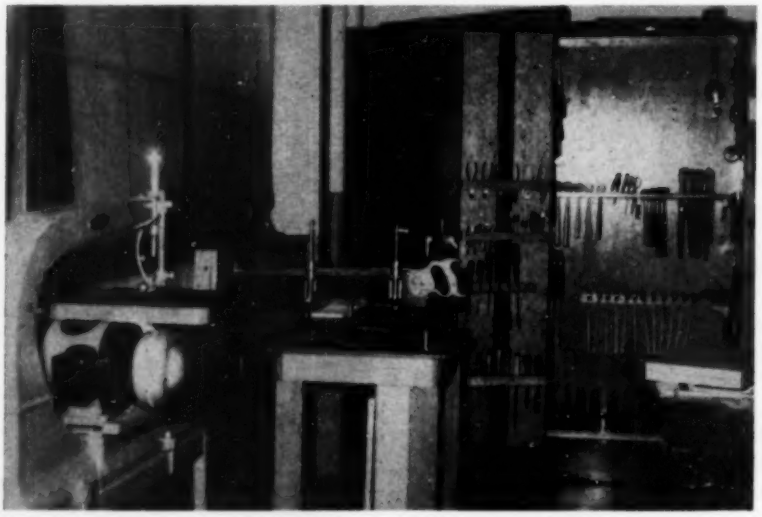


Fig. 3. Small table used for miter-box support

getting the maximum amount of light on, and efficiency out of, the working area.

After the proposal for a new shop was accepted by those in authority and the money appropriated for installation and equipment, Mr. Koehler recommended to Mr. Hochstuhl, secretary and business manager of the Bloomfield board of education, that the writer prepare the final arrangements and do the actual work of building and reconditioning during the summer vacation. This work was begun on June 23 and completed on August 8, 1952. In addition to using the workbenches which had been stored, a metal supply cabinet was converted to a tool cabinet by lining it with plywood. See Figure 2. Two tables, one for the miter box saw, Figure 3, and the other for the electric oven, Figure 4, were built from materials on hand. A maple top table was built for the machine bench. This is a combination unit giving storage space as well as a machine workbench. A metalwork bench was made by assembling two woodworking benches and covering them with a "masonite presdboard" top.

Because of the methods used in the installation, room 11 can be reconverted at any time to an ordinary classroom with a very small expenditure, as no change was made in the actual room structure.

Burton Davis, graduate of New Jersey State Teachers College, teaches in the new shop. He assisted during the summer, and constructed project shelves and other devices necessary to start his classes in September.

This new shop accommodates all seventh-grade boys. It is figured that the maximum load it can carry is 300 boys. At the present time there are 210 boys using it. Since these boys are no longer in the general shop we can now accommodate all ninth-grade boys who wish to take further work on a two-period-a-week basis. In addition, we have room for 50 ninth-grade girls for our part of the cycle core in the related arts field for homemaking majors. We plan to have some boys work more than two periods per week in the general shop. Thus, by the establishment of the new small tool shop, we have not only created a better experience for seventh-grade boys; we have made at least partial provision to satisfy the needs of our ninth-grade boys, and we have implemented still another suggestion of the curriculum development committee, that of utilizing shop facilities for training girls as future homemakers.

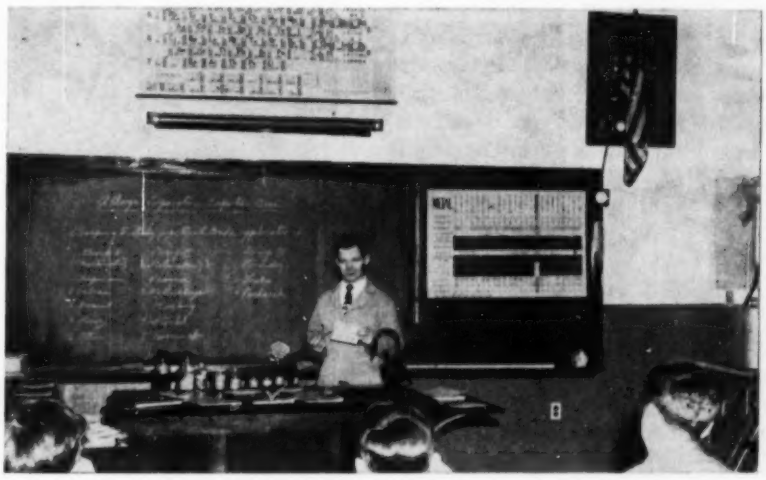
A Multiple Purpose Science Room

ALFRED S. DREW
Science Instructor
School of Vocational and Adult Education
West Allis, Wis.

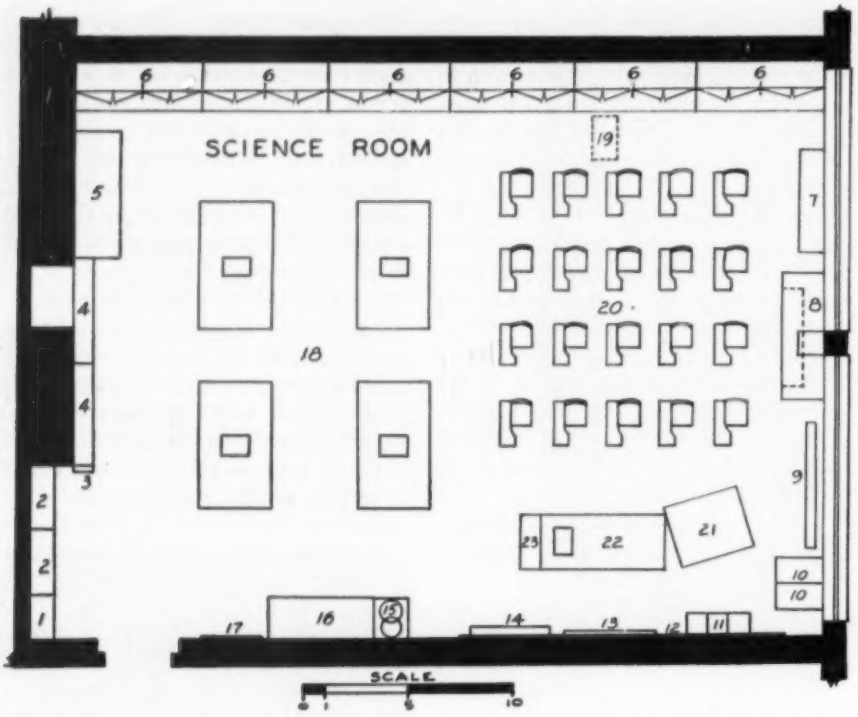
How can a science room be made flexible enough to provide for the needs of a growing, constantly changing student body? We don't have the answer, but we do have some ideas and training aids which may be of interest to others. This article is an attempt to show how the School of Vocational and Adult Education at West Allis, Wis., is currently trying to make optimum use of its science room facilities.

Our present program provides courses in related science for apprentices, high school credit courses for adults, science for evening technical engineering program students, and special science courses for adults who want to become more competent in their jobs. Both individual instruction and group instruction have been provided. The student load has varied from one to 28. The room has been utilized for periods varying from six clock hours of instruction per day to 24-hour-a-day operation on special war training programs.

Economy of operation of our system demands that the science room be organized to provide for individual instruction. For



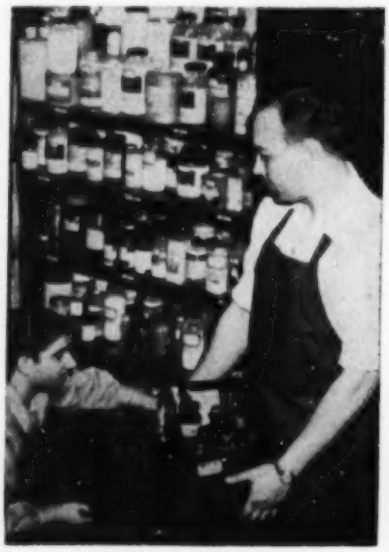
Center for group instruction



Science room — approximately 27 ft. 4 in. by 36 ft. Science room is located on the top floor of building. Skylights above student laboratory tables not shown

1. Clothes locker
2. Steel cabinets or chemical storage
3. Fire blanket
4. Shelves for chemical reagents — liquids
5. Shelf for balances. Built in drawers for storage of weights
6. Wood cabinets for storage of equipment and supplies
7. Univent
8. Shelf for muffle furnace and electric oven. Built-in case for magazines
9. Radiator
10. Filing cabinets for students' records, teaching aids, and unit reference folders
11. Wood filing shelves for storage of unit sheets
12. Chalkboard
13. Screen for showing films mounted above chalkboard
14. Cabinet for display and storage of charts
15. Water still and storage
16. Fume hood with cabinets in lower portion — fire extinguisher attached
17. Bulletin board
18. Student laboratory tables
19. Position of film projector when in use
20. Student arm chairs
21. Instructor's desk
22. Demonstration table with drawers and cabinet
23. Wood shelf attached to demonstration table

example, consider the varying goals of adults in a science class (exclusive of the apprentice and the evening technical engineering programs). The class enrollment may include a foreman of an electroplating department. He has the practical know-how of his trade, but he wants to increase his knowledge of the scientific principles and theories upon which his trade is founded. An alert worker in a galvanizing department may enroll in the class to learn why his dipping tanks are being "eaten away." A laboratory technician in a local brewery may want to learn more about solutions and fermentation. A young lady may need a credit in high school chemistry to qualify for training as a nurse. A veteran may want high school credit in physics to prepare for an engineering course in college. Yes, these people may all be in the same class. Flexible programs of instruction must be available. The instructor must operate efficiently. He must have resource materials at his finger tips. He must make provision for each student to enable him to work with a minimum of guidance and supervision of the instructor as soon as possible after enrollment in the class. In other words, each student should be capable of self-direction.



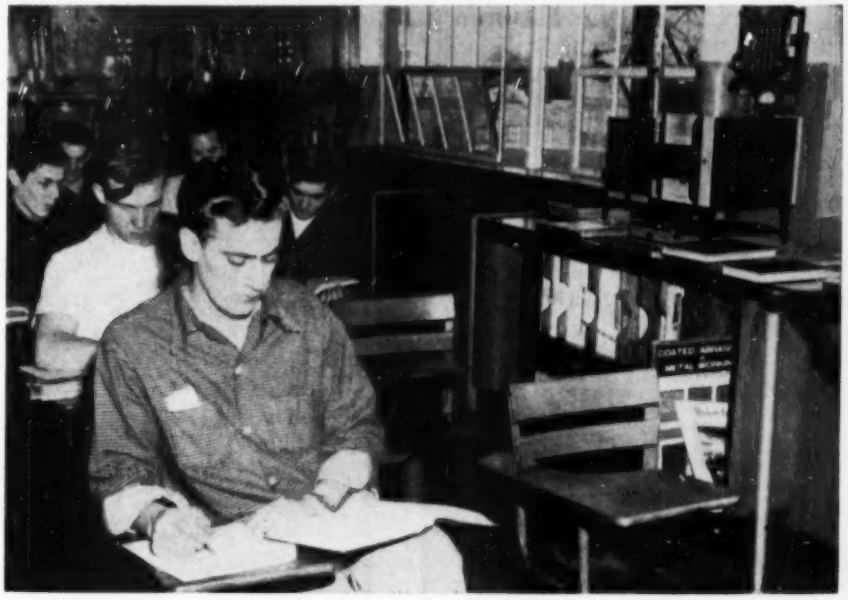
Chemical storage

To achieve this aim of student independence, this instructor provides for: (1) an initial interview with each student; (2) orientation of each student to the location and proper use of all resource materials which that particular student may utilize; and (3) frequent observation and testing. The accompanying photographs of the science room show the proximity of resource materials to student work areas. Note the use of unit boxes for the efficient handling of materials. In the initial interview just mentioned, this instructor attempts to get background information on the needs, desires, and experiences of each student. Why are you here? What do you expect to get out of this course? What previous science courses have you had? What do you do? The answers to such questions provide the basis for tailoring a course to fit a student. Often, several students will study the same or similar science concepts together, but the applications of those concepts by the individuals will vary.

At present, our major course of science instruction is a program of related science for apprentices. Apprentices from several trades are assigned to the same class. As a group, they study science topics and concepts which are common to their trades. Then each apprentice is encouraged to make maximum use of the varied resource materials in the room in order to understand how such science concepts are utilized in his own trade. For example, this instructor furnishes his apprentices with a unit sheet (a modified form of a job sheet) which has the following sections: the title; general objectives; a general information section which outlines the importance of the topic and tends to arouse student interest; a reference section, and a special tools section, in which resource materials are listed; the procedure, in which certain jobs or assignments are outlined; and the final section, the conclusion, in which the apprentice is urged to cite specific trade applications. Writing space is provided on the unit sheets for the taking of notes. All apprentices are requested to keep the unit sheets in loose-leaf folders. The instructor usually presents a topic by means of a lecture, film, filmstrip, demonstration, or a combination of these. A class

discussion, experiments by students, or a reading period may follow the presentation. Unit folders which contain up-to-date articles on specific topics serve as valuable references. Finally, a short test is administered and discussed with the students. The apprentices are also asked to fill out trade application cards. These cards require an apprentice to state a science concept he has been studying, to list his trade, and to give an illustration of the utilization of that concept in his trade. This instructor expects to eventually organize individual courses of study for every trade represented in the class. These application cards will make the instructor's task of job analysis easier. By referring to these cards, new apprentices can benefit from the experiences of those who preceded them.

Programs employing the method of individual instruction, and group programs organized to meet the needs of individuals, require a variety of resource materials and sufficient storage space. Our director, Roy R. Van Duzee, encourages members of the staff to design equipment to meet instructional needs and to improve room layouts. Our T. and I. co-ordinator, Victor Schmitt, often returns from neighboring industrial plants with good ideas for the science department. Our T. and I. supervisor, Clarence Rossow, a draftsman by trade, has a knack of cultivating a spirit of co-operation among shop teachers and getting things done. As a result of such co-operation, the science room has acquired a Prony brake, a model drop hammer, a special magazine case, shelves, and cabinets from the woodworking shop of Arnold Dietrich. An electrical "breadboard," made to function with other related equipment in the science room, was assembled by students in the electrical shop taught by Henry Tillich. Unit boxes for chemical reagents, and equipment for experiments concerned with coefficients of sliding friction and of rolling friction were developed as student projects in the sheet-metal class of M. J. Shogren. Frequently, instructors in the welding shop (Chas. Zielke), the machine shop (Walter Froncek), the blueprint room (J. A. Vojta), and the print shop (E. C. Raasch) are asked to help in a project. They offer their services freely and often make valuable suggestions for improving a design. The point that this writer desires to put across is that when a science instructor develops good human relationships with other staff members, including maintenance personnel and office personnel, the science program and the science facilities are bound to be continuously in the process of improvement.



Study area and reference library

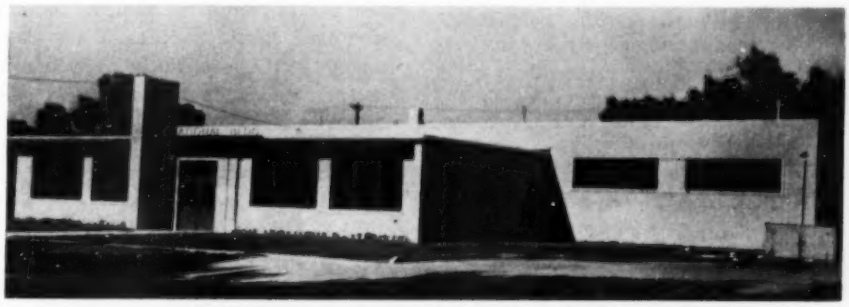
The photographs and the diagram included in this article show the arrangement of facilities which make possible the current programs of science instruction at the West Allis School of Vocational and Adult Education.

New Shop Building— Kinsley Vocational School

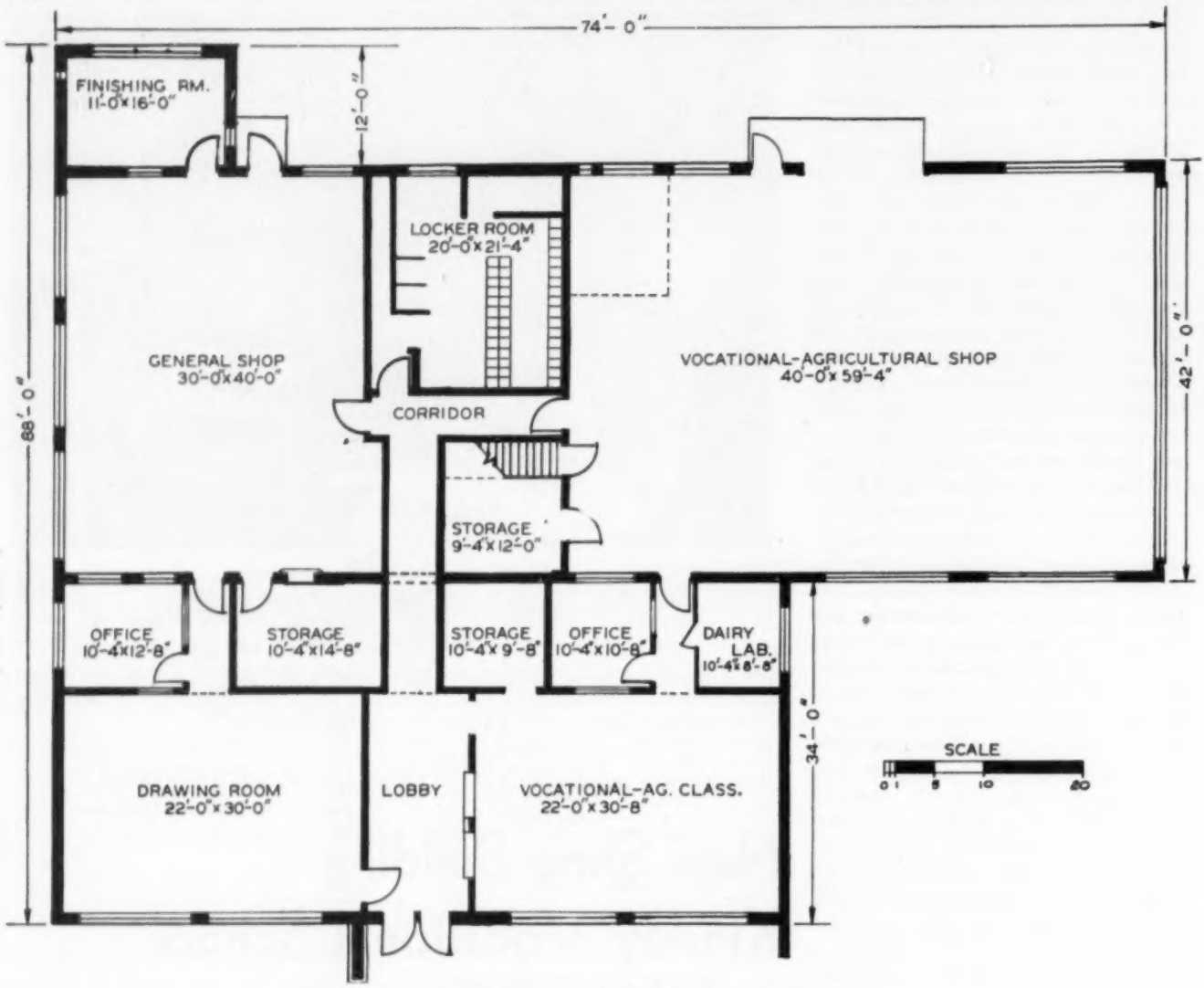
LESLIE A. DEMERITT
Principal
Kinsley Vocational School
Kinsley, Kans.

In an agricultural community such as the town of Kinsley, Kans., with a population of 2500, a vocational-agriculture building is definitely an asset and almost a necessity.

It not only gives the young people of the community an opportunity to develop their ideas and make use of their own abilities but it also is a convenience to the community.



Kinsley new vocational-agricultural building



New vocational building at Kinsley High School, Kinsley, Kans.

Courses

There are two sides in an agricultural course: the practical and the technical. In the classroom the students are taught how to manage a farm profitably, and they are given the chance to apply this knowledge in a practical way on field trips and in the modern shop.

In the woodworking department the boys have an opportunity to make things which are both instructive and useful in the home. The boys are taught to work accurately and speedily with the aid of modern tools.

Planned for Efficiency

Plans for constructing the new vocational building had been started two years before the loss of the old building through fire. J. O. Brown, vocational instructor at that time, and Howard Blanchard, architect, had planned together so that weaknesses in the old building might be corrected in the new one.

Certain principles were kept in mind throughout the entire planning. The interior was to permit the students to work under ideal conditions, both in the classroom and in the shop. In the classroom the outstanding features are the use of soft-tone colors, green-colored chalkboards, adequate lighting, and 250 square feet of window space which will help to cut down eyestrain and fatigue.

Financing the Building

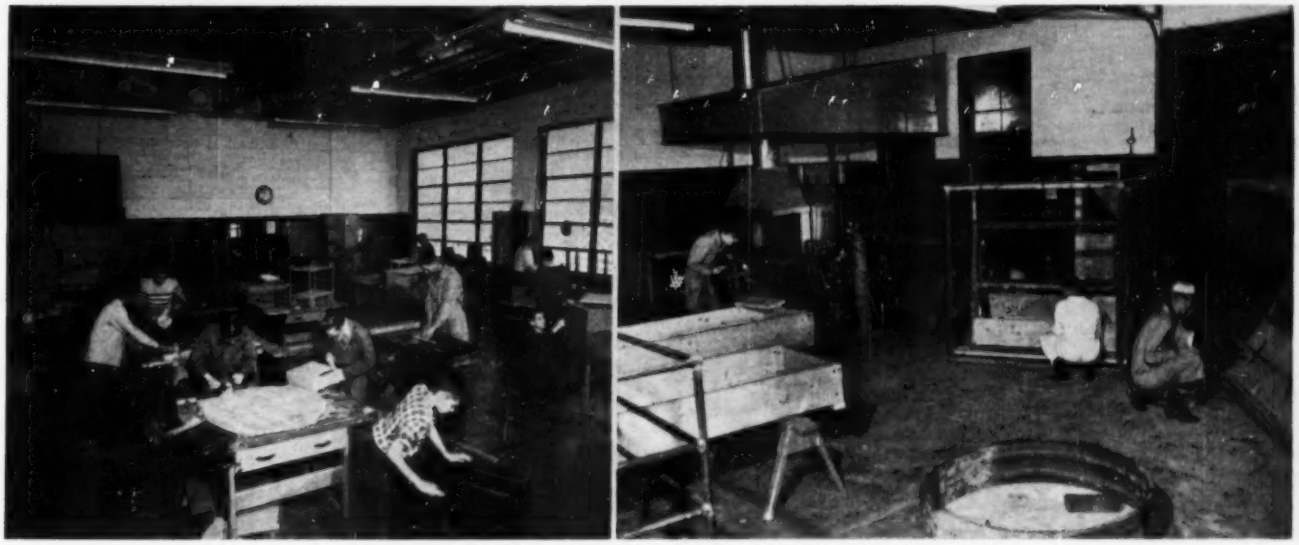
This building is one of the few of its kind which was built without the use of bonds. The money was raised in three ways: (1) by a two mill levy in taxes for three years prior to construction, (2) insurance from the old building, and (3) by money appropriated from the school budget for the next year. The original estimate of the contractors totaled $63,000, but, because of increased costs, the final price of the building was over $70,000.

Kinsley spent $14,000 in equipping the building.

Working Areas

Working areas are provided for the 129 students at the present time and the veteran trainees who use the building one night each week and on Saturdays.

In the industrial-arts shop, 24 junior high school students, under the supervi-



Woodworking and welding areas at the Kinsley Vocational School, Kinsley, Kans.

sion of Wayne Herron, are allotted 1376 square feet in which to work plus 660 square feet in classroom area.

The woodworking class which includes 65 students and their instructor, Homer Salter, also uses the industrial-arts shop. Space is also provided for mechanical drafting.

There are approximately 2400 square feet of working area for the 40 students under the direction of Leslie Demeritt in the Vocational-Agriculture division. The dairy laboratory and the classroom have a total of 750 square feet.

The combined storage space for both departments totals nearly 1100 square feet. Of this, 760 square feet is devoted to the storage of wood.

Outstanding Features

The vocational building in Kinsley has many special features. A suction fan was built into the wall of the finishing room to draw out foreign particles in the air. Directly opposite the fan is a filter through which fresh air constantly flows.

A fine display case is located at the entrance where outstanding and interesting projects made by the students may be displayed.

A fully stocked dairy laboratory and soil testing equipment are features in the vocational-agriculture department.

Leadership in Industrial Arts

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Business and industry recognize the idea of "one leader" as a fallacy. In education the same premise holds true. Any school system or college that depends upon the all-wise leadership of one individual is not built on a firm foundation. It may flourish for a time, but if the key individual leaves or if his influence begins to wane, retrogression usually takes place.

Likewise the idea of "one leader" in industrial arts is also a fallacy. The most successful public school industrial-arts programs are the result of co-operative rather than individual control. The utilization to the fullest extent of the best thinking and practices of teachers, supervisors, and administrators makes for growth and harmony. The resultant pool of ideas is interpreted, culled, and organized for effective use.

Supervisor and the Superior Teacher

It has been said that the supervisor has only the authority of his own ideas. To our way of thinking, this statement should be amended to read, "the supervisor has the authority of his own ideas plus the cumulative ideas of the best people in his field." Any supervisor who believes he has a corner on intelligence or thinks he knows all the answers is only deluding himself. For example, in the teaching staffs of many

city school systems there are superior teachers who would be quite successful in supervision. Some of these teachers have, upon occasions, refused offers of supervisory positions, preferring to remain industrial-arts teachers.

Certainly we must not depreciate the value of an inspirational leader, whether he is a supervisor or a teacher. However, the inspirational quality of leadership does not preclude co-operative control; indeed, it strengthens it.

The industrial-arts supervisor cannot be successful unless he has the active support of the teaching force. He should use its members to help formulate policies and practices and take their advice and counsel on curriculum problems and other educational matters. The successful teacher has a similar relationship to students in his shop classes. A functional, democratically controlled personnel organization is an example of co-operation and teamwork which is the foundation of good citizenship.

"One Leader" Idea in the Teacher Education Department

The fallacy of the "one leader" idea applies equally well to heads of industrial-arts teacher education departments in colleges. The attempt of the "one leader" to dominate the thinking of his staff and students is to be deplored. This practice is especially bad on the graduate level, where the students are mature men in many cases with teaching experience. There have been instances where students have been advised to discontinue graduate work because their ideas did not wholly conform with those of the "one leader." Graduates who come from a "one leader" teacher education department have a difficult time adjusting themselves to school systems where freedom of thought is encouraged and where flexible industrial-arts programs are in operation. The wise head of a department in a teacher education college surrounds himself with a strong teaching staff and uses its thinking and experience to formulate policies and practices. He refrains from forcing his ideas on others and encourages his students to do original thinking and make unbiased decisions.

On the national education scene there is danger of leadership invested in too few individuals. Instead of carefully evaluating and weighing the ideas and philosophy of these leaders, we are likely to accept them as 100 per cent reliable and valid. Later, we discover that what they have written and said sometimes *does not hold water* in the light of our experience.

The industrial-arts program nationally is strong because it has not followed blindly one individual or small cliques of individuals. On the contrary, the best ideas from leaders in all parts of the nation have been pooled. From these ideas, based upon experience and research, there is evolving a national program of industrial arts that is modern, practical, educationally sound, and flexible enough to meet the peculiar needs of communities everywhere.

Stockton Unified School District

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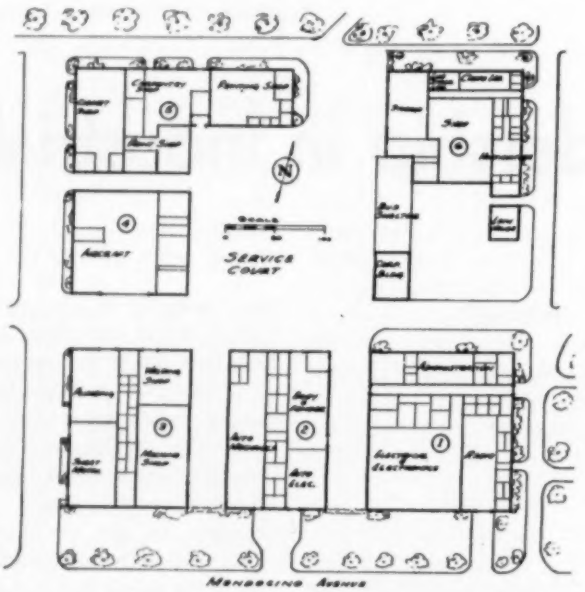
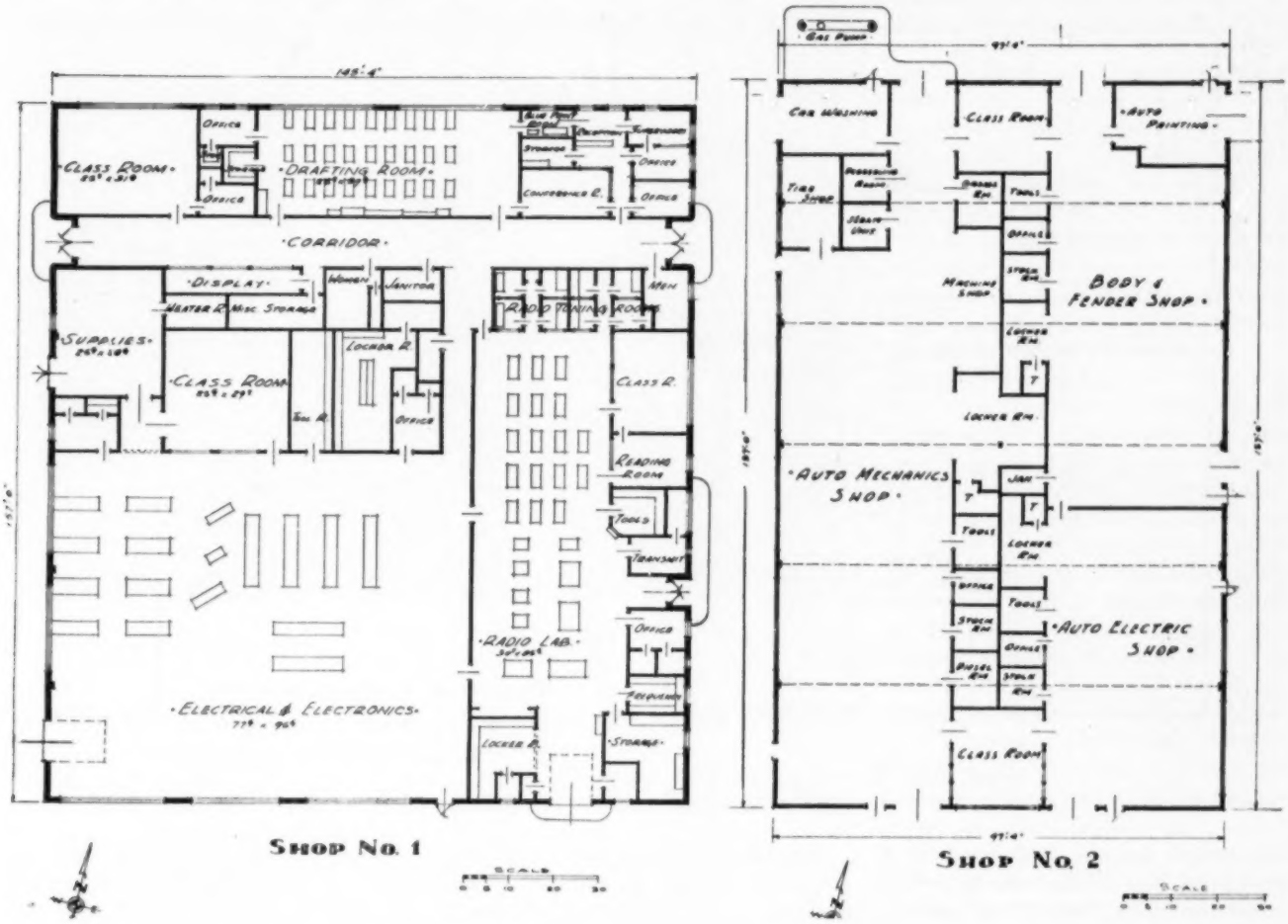
When the Stockton Unified School District started operating on a 6, 4, 4 administration plan, it gave the district six-year elementary schools, 7, 8, 9, 10 years for high schools, and 11, 12, 13, 14 years for college. For several years prior to starting this plan the vocational and industrial-arts department began studying the aims and objectives of shop programs for the above age groupings.

The determining of these programs gave us data upon which to base our requests for new shops and classrooms. The trade and industry shops up to that time were all housed in high schools. This meant an entirely new group of shops and facilities for the college to house the vocational programs. The old vocational shops in the different high schools could then be used for industrial-arts purposes.



New shops at the college were planned with the help of all our different trade committees. This procedure helped give us



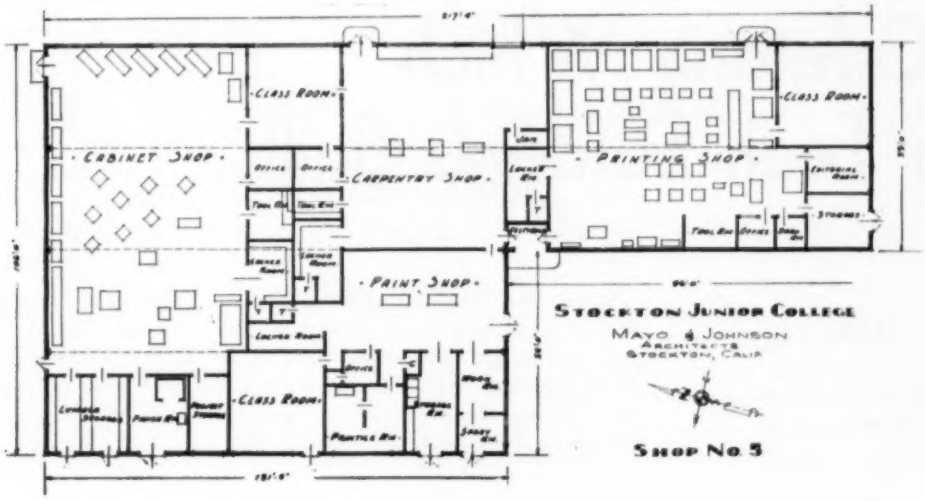
SHOP NO. 1

SHOP NO. 2

shops to meet local needs and set up public relations in the community that were most desirable. This method of planning also gave a clear concept of the difference between a vocational and an industrial-arts program to the citizens and trades people of our community. When an industrial-arts course is now mentioned in a trade committee they no longer seem so critical nor ask so many off-the-beam questions.

Six large shop buildings were originally planned for the Stockton College. Due to a shrinkage of funds only three of the buildings were constructed. To conserve campus space from three to four shops were planned for each building. Building trades, metal trades, electrical trades, automotive trades, aircraft trades, and agricultural activities were grouped together in unit shops.

The high school shops were all revamped and set up on a more functioning basis. Shop experiences were planned on a general educational basis. Guidance for further



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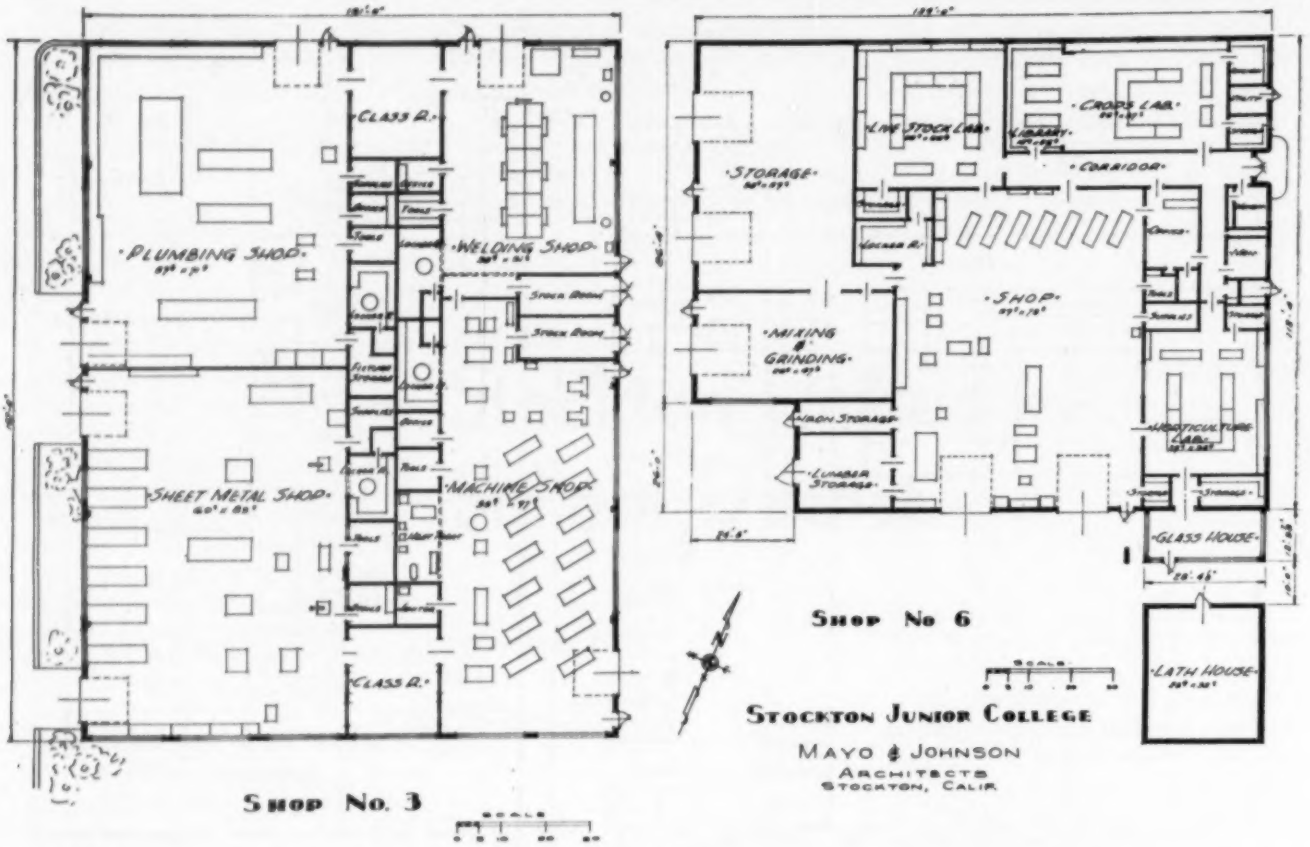

shop training was one of the functions of these shops. Giving more meaning to regular school subjects, through shop activities, were studied and definite recommendations made. Rotation of students through, what we term, basic shops was planned, and a record system set up to follow the student through all his different shop activities.

After these different shop experiences have been obtained, the student is allowed to choose a particular shop he desires to work in. The card record system was also to follow him in his elective shopwork. At the end of his high school shop experiences his record card is sent to the college guidance office for further use.

When planning the college vocational shops special consideration was given to the evening apprentice, trade extension, and adult programs. Electrical engineers recommended the lighting installations, and rooms in the shop buildings were designed purposely for the accommodation of evening school classes.

The Cafeteria Which Smith Tech Students Built

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When Mrs. Grace S. Saunders, director of the Syracuse School Lunch Programs, remarked to me, "You should have a cafeteria at Smith Tech," I agreed, but I did so with the condition that we use the kitchen and cafeteria for training. Mrs. Saunders accepted this suggestion and our cafeteria is now in operation. In it are trained students in food administration, and a major portion of the installation was made by students in training.

It was decided to use our auditorium,

Students making final installation of stainless steel trim of cafeteria counter

a room 30 by 55 ft. for the cafeteria, and a small adjacent space, 18 by 22 ft. for the kitchen.

Eight of the industrial departments of the school co-operated in the design, layout, and installation of equipment and facilities. The instructors in drafting, sheet-metal fabrication, and welding, visited five of the cafeterias in the larger industrial plants of the city, and made extensive notes on the arrangement of counters, serving facilities, and kitchen layout. The drafting department then drew up plans for the counter, combining all the outstanding features of the cafeterias visited. The students in the sheet-metal department then started the layout of the stainless steel for the counter top and other elements.

In the meantime, the students in the carpentry shop began work on the knotty pine wainscoting which would cover the walls of the room up to a 6-foot height. With the installation of the wainscoting, students of the painting and decoration department stained the pine to a rich golden brown and painted the walls above a pastel green, with darker green trim.

The lighting fixtures, which are standard incandescent globes, were covered with sheet aluminum shades made of concentric rings of metal, designed and fabricated in the sheet-metal shop. Radiator grilles were fabricated by the students out of sheet metal perforated with 1-inch square holes made with a punch and die built in the machine shop.

As the fabrication of the counter proceeded, the welding department was extremely active in the fabrication of the angle iron frame for the counter, and the tray rail and shelf supports above the counter. While this was going on, the students in the refrigeration department were busy in the design and layout of the necessary cooling units for the counter and the kitchen. In the basement, three condensing units were set in place. One was designed to cool the frozen food storage and ice cream section of the counter, one was connected with the salad tray, and the third was used to provide refrigeration for the milk cooler in the counter and the reach-in cooler of the kitchen. A control panel was installed above the compressors, with all the necessary pressure gauges, control valves, and electrical control switches. The students then ran copper tubing up and along the cellar ceiling, through a hole in the cafeteria floor and to the cooling coils.

In the counter, the ice cream box was constructed of a large aluminum tank, fabricated in the sheet-metal department. Glass wool insulation was fitted below and around the cooling coil which forms the inner section of the box. In the same manner, the milk cooler was fabricated and cooled with a fan circulating unit. The salad tray was likewise insulated and perforated stainless steel sheets installed above the plate coil. Trim on the outside of the counter is entirely constructed of stainless steel, fabricated by the sheet-metal department and welded by the students in the welding shop.

The hot section of the counter is entirely electrical and a special line was run from the main panel board by the students in the electrical department, providing power for the steam table, the toaster, and the coffee makers, as well as the electrical appliances in the kitchen.

Many students assisted in the final buffing of the stainless steel trim of the counter. Knotty pine siding was installed on the outside of the counter, to harmonize with the trim in the room, and stained to match.

With its completion, Smith Tech not only has an extremely attractive and modern cafeteria, but a deep satisfaction on the part of all the students and faculty members in the planning and accomplishment of this joint project.

Tool Storage in the School Shop

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Wherever tools are used the problem of tool storage is present. The school shop is no exception; proper tool storage facilities are vital to an effective and efficient industrial-arts program. The commonly used methods for storing and checking tools and equipment in the school shop is a matter that appears not quite settled to the satisfaction of many industrial-arts

teachers. Some important considerations in regard to tool storage include safety, economy of space, efficient tool arrangement, a simple method for checking tools, expandability for the addition of tools in the future, accessibility, and the orientation of the storage facilities in relation to the total shop layout.

Trends in Tool Storage Facilities

For years, industrial-arts departments have simulated real-life industrial situations through the use of toolrooms. While the toolroom provides a situation which is close to certain firsthand industrial experiences, it often presents obstacles that limit the efficiency of the school shop and restrict the actual working time within the class period. Some inherent disadvantages of the toolroom system of storage are listed in this article.

1. *Valuable floor space is wasted.* The floor space in many school shops is not adequate; therefore, the space ordinarily used for toolrooms is needed more for other phases of the industrial-arts program.

2. *Valuable working time is wasted.* Much working time is lost while students are waiting in long congested lines for tools and materials, especially at the beginning and the end of classes.

3. *Complications restrict efficiency.* Unless a paid toolroom man is employed, the more common practice is to organize each class in such a way that every class member is given the responsibility of toolroom clerk during specified intervals. The principal difficulty with this method is that the toolrooms are usually so complicated that the average student cannot learn the system and location of the tools well enough during his limited time as tool clerk to do his job efficiently.

4. *Student clerks lose valuable class time.* In most cases, it is questionable whether the time spent as toolroom clerk instead of in *regular* class can be justified.

5. *Tool checking is difficult.* As a rule, the tools are often arranged in such a way that it is difficult to check them readily.

While the afore-mentioned common objections to toolrooms are not serious problems in all schools, some have encountered additional toolroom problems that are peculiar to their particular industrial-arts programs. Regardless of the arguments against toolrooms, they are feasible in certain school shop situations, one of which is in shops where expensive, delicate, and precision equipment is used.

Fig. 1. Tool storage cabinet used at Oregon State College
— Photo by Arthur C. Corbett

One current trend in school shop planning and organization is the increasing use of tool storage cabinets and tool panels. In some cases, according to design, it is a rather thin line that distinguishes a tool cabinet from a tool panel; however, both have similar characteristics that contribute to their popularity in the shop. Some of their more attractive advantages follow: (1) They make possible a more effective use of floor space. (2) They tend to eliminate long congested waiting lines. (3) They eliminate the need for *full-time* toolroom clerks during the entire class period. (4) They simplify tool arrangement and facilitate ease in tool checking, etc. These particular advantageous features are accomplished, in general, through the use of several localized tool storage cabinets and/or tool panels. The mere act of storing the tools out in the shop near the work stations increases effectiveness and efficiency in the industrial-arts program. The tools should be stored as near to where they are used as is practicable.

Safety

Safety is a very important item in all phases of education. The application of safety in regard to tool storage is definitely in line with the aims of general education because good, safe habits are stimulated and established. Much of the safety pertinent to tool storage is not limited to the

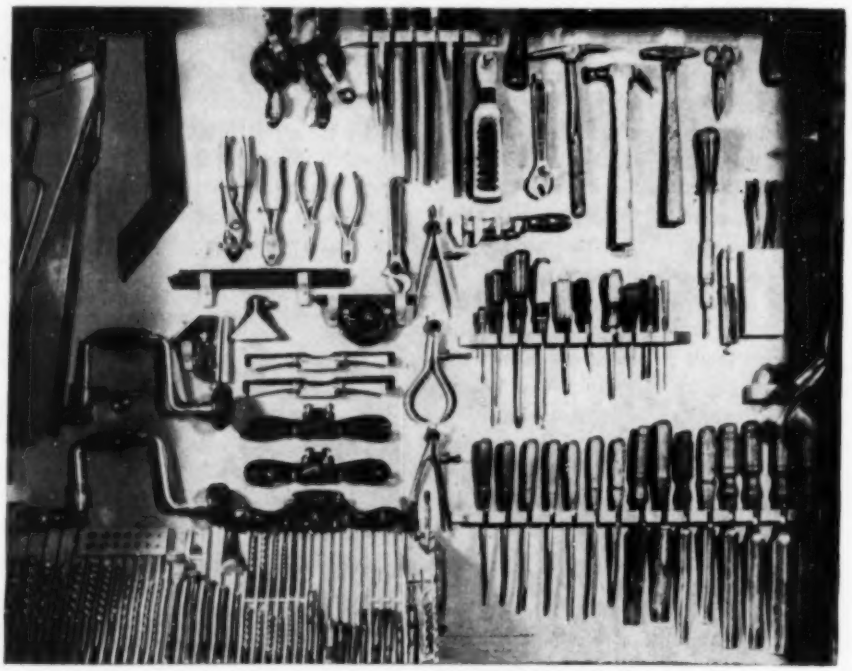

Fig. 2. Tool arrangement. Similar tools should be grouped together as much as possible
— Photo by Arthur C. Corbett

school shop; most of it can be carried over into daily living. Some of the more important safety precautions in regard to tool storage, follow:

1. *Place sharp-edge tools below eye level.* To minimize potential accidents, all sharp-edged tools should be placed below eye level.

2. *Hang the tools securely.* Suitable tool rests should be provided so that the tools are placed in secure positions.

3. *Arrange the tools so that they are accessible to everyone.* For safety as well as for maximum efficiency, the tools should be placed so that they are easily and readily accessible to everyone. Tools that cannot be taken and replaced while a person is standing in a natural position tend to encourage accidents.

4. *Stress the handling of tools with care.* It is of utmost importance that the tools are handled with care at all times. Horseplay and other forms of behavioristic deviation should neither be encouraged nor tolerated — accidents, not only to the tools but to individuals, may easily result.

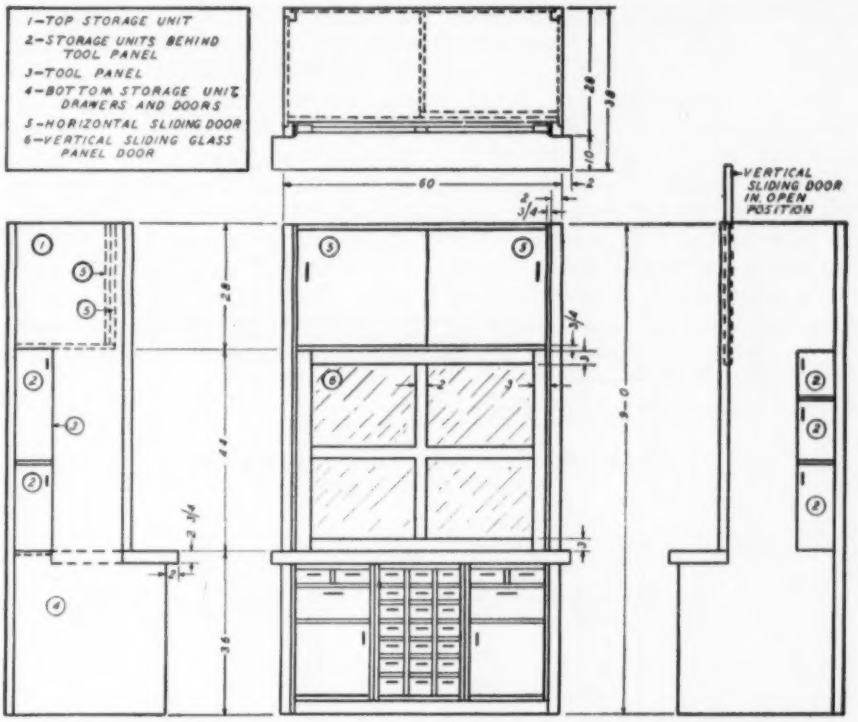

Fig. 3. Plans for a tool storage cabinet. Based with minor modifications upon the cabinet in Figs. 1 and 2

The Orientation of Tool Storage Facilities

The location of the storage facilities in relation to the shop floor plan is vital to a safe, efficient, and effective industrial-arts program. Some important orientation considerations in addition to safety include location of the storage facilities, economy of floor space, and traffic routes.

The location of tool storage facilities. Regardless of the type or combinations of types of tool storage facilities chosen, it is better, in general, to have them located near the center of the long side or sides of the building. This general rule is based upon the assumption that in most shop situations the tool storage center or centers will be nearer to the work stations. Exceptions to this general rule are feasible when several tool storage facilities are provided and located near specific working areas. For example, storage facilities for lathe tools near the lathes, storage facilities for hand tools near the work stations, storage facilities for power tool attachments near the power tools, etc., tend to centralize the storage of tools close to where they are used. This method helps to increase the effectiveness and efficiency of the shop.

General tool storage facilities should be located at a safe distance from power tools. These areas are often congested while tools are taken and replaced; therefore, an accident is more likely to occur if power tools are located too close. In addition, even work stations where hand tools are principally used should not be located too near to the storage facilities.

Economy of floor space. One of the important advantages of tool cabinets and tool panels is that they require a minimum of floor space.

Traffic routes. Tool storage facilities should be placed so that natural traffic routes lead to and from them. This is not only conducive to safety but to shop efficiency, too.

The Design of Tool Storage Facilities

Expandability. Changes take place continually in the school shop; therefore the future should be considered when tool storage facilities are designed. Space should be allowed for additional equipment and all tool rests, jigs, and fixtures should be attached in such a way that they may be readily rearranged.

Conservation of space within the cabinet. Unless time and proper attention is given during the designing stages, it is likely that waste space will occur within the tool cabinet. Usually, wall space can be conserved when tools are removed or replaced on their respective tool rests from the front. When the tools are removed or dropped in place from above the toolrests, more space is usually needed.

Appearance. Tool storage facilities should have a good appearance. The fact that they are used for storage is not sufficient reason for poor design or crude workmanship. The design and construction principles that we, as industrial-arts instructors teach in our courses should be exercised, too, when we design and build tool storage equipment.

Student participation. Naturally, students should not be exploited; however, in many instances the designing and construction of tool storage facilities illustrate basic industrial operations and offer valuable experiences that the students would not otherwise encounter in the course. Therefore, whenever possible, students should have an opportunity to participate in designing and constructing storage facilities.

Ease in Tool Checking

The storage facilities should be designed so that the tools can be checked easily. Regardless of the various methods of tool arrangement and type of tool marking used, the primary purpose is for conven-

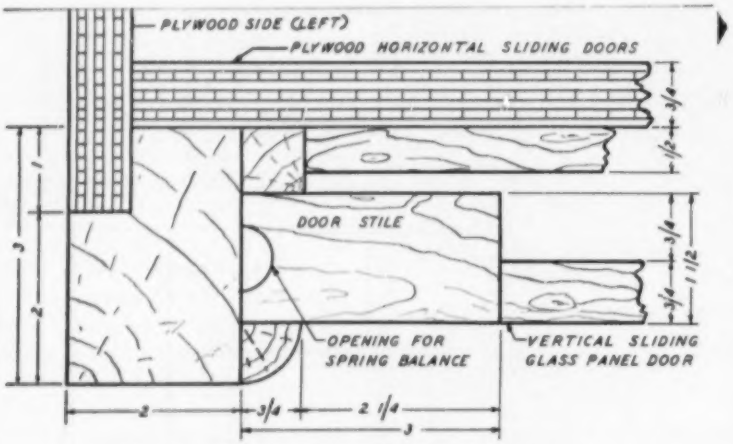

Fig. 5. Details of vertical sliding glass-panel door and adjacent area

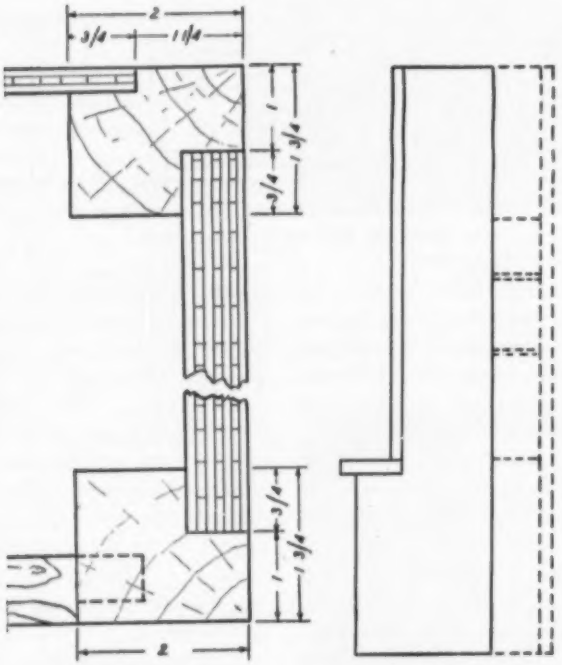

Fig. 4 Fig. 6

Fig. 4. Details of corner construction. Fig. 6. Modification. The depth of the drawers and shelves is shortened and the storage unit behind the tool panel is omitted

ience and efficiency. Several methods are mentioned.

Tool arrangement. When tools are grouped into *tool families*, the task of checking is easier. Figures 1 and 2 illustrate this. The various tools such as bits, chisels, saws, and others are grouped together, respectively.

Marking the tools. Various systems of marking tools exist. While some are relatively simple, others are extremely complex. Again, for ease and efficiency, use the simplest method that will work well. If a simple color code is adequate, the process of stamping or painting numbers on tools may only cause more confusion.

Color identification. When more than one storage unit is used in a shop, it is advisable to have a color code for each cabinet. For example, in the woodshop at Oregon State College the tools that belong to the various tool cabinets are painted according to the respective cabinet's color code. The handles of the tools that belong in one cabinet are painted yellow, the handles of the tools in another cabinet are red, etc.

Tool silhouettes. Tool silhouettes are a very effective means for making checking less complicated. In some shops the silhouettes are painted directly on the panels while in others the silhouettes are first cut out of sheet metal or thin plywood, painted, and screwed in place. The silhouette is often combined with the particular holding device, especially when made of thin metal.

Tool rests. Use only enough tool rests or racks for the actual number of tools in the cabinet. Extra ones only complicate tool checking.

Plans for a Suggested Tool Storage Cabinet

The proposed tool storage cabinet is based (with minor modifications) upon the type of tool storage facilities used in the *wood industries* experience areas at Oregon State College. The tool cabinet shown in Figure 1, has been in use for quite a number of years. Although it has certain inherent limitations, the fact that this cabinet has been sufficiently adaptable to successfully meet the changing needs within the shop indicates that it merits some consideration.

Construction details. One of the main differences between the two shown in Figures 1 and 3 is that the proposed tool cabinet in Figure 3, is constructed, mainly, of plywood. With the exception of the back which is of ¼-in. plywood, all other plywood which is used is ¾ in. thick. Solid pieces are used on all corners to strengthen the cabinet and to camouflage the ends of the plywood panels. Details of corner construction are shown in Figure 4.

Details of the vertical sliding glass panel door are shown in Figure 5. A spring balance is suggested for this door; however, other means can be used satisfactorily.

Accessibility, flexibility, and expandability. The tools which are used most often should be placed where they are easily accessible to all students; thus, these particular tools should be placed on the panel behind the glass door.

This cabinet is flexible and expandable. Tool rests or racks are fastened temporarily in place. Also, the bottom units which are composed of drawers and *door-enclosed* shelves have potentials of being very flex-

ible and expandable. Since each basic unit within the bottom section is made as an independent unit, it is a relatively simple operation to modify any one unit.

Safety. One bad safety feature in this cabinet is the extreme height of the top unit from the floor level. Materials that are seldom used should be stored in these top units. In some cases, in grades below college level, it may be feasible for the instructor to withdraw and replace the tools and materials which belong in the top storage unit.

Modifications. One common trend, in shops with limited space, is to attach a chalkboard to the sliding doors on tool cabinets. In most cases, the instructor addresses the whole class when he uses the chalkboard; thus, during these times no one would need access to the tools.

In certain situations it may be advisable to minimize the depth of the tool storage cabinet. This cabinet is designed so that by merely shortening the length of the drawers and the depth of the shelves and omitting the side drawers and/or doors, the width can be shortened easily. Figure 6 illustrates this.

Conclusions

Tool storage is an important item that deserves the most careful consideration in the school shop. For maximum effectiveness in the industrial-arts program, tool storage facilities must be safe, adequate, convenient, and conserve both student and teacher time. Much valuable learning time can be lost when clumsy and inadequate tool storage arrangements are used.

Teaching Aids and Busy Teachers

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This is an era of teaching aids. More and more teachers are making and experimenting with them. The amount of work involved in developing an aid that you are not sure will do the job intended is often discouraging. In the Detroit area, busy teachers may examine and even try out several teaching aids before making one. This saves time and work, and the teaching aid finally produced is generally an improvement over others previously made.

The teaching aids library, sponsored by the Department of Industrial Teacher Education at Wayne University, was formally opened on June 8, 1952; printed invitations encouraged 211 teachers and students to attend.

Development of the library has been a major project of the Industrial Education Guild, a student organization. Frank C. Stroh, industrial-arts teacher in Riverview, Mich., Robert J. Suda, graduate student, and Stephen M. Wichar, industrial-arts teacher in Detroit, are the chairmen of the major committees of the Guild. Painting and remodeling of the area was done by student members. Dr. G. Harold Silvius, chairman of the department, acted in an advisory capacity.

The library includes three classifications of teaching aids: ***instructional, administrative,*** and ***production.*** Those which supplement instruction, testing, or serve as references for subject matter may be a series of models in various stages of completion, large size drawings and charts, and working models which help to explain operation of a large part, or of cutaway sections.

The second group facilitates administration of the activity program, and consists of such things as systems for checking out tools and job assignment boards.

Fig. 1. Shop planning and teaching aids on wall strips. Wayne University, Detroit, Mich.

The third group consists of special tools, jigs, and fixtures for making Red Cross toys, and other production jobs.

Among the ***administrative*** and ***instructional*** teaching aids on exhibit are those shown in Figures 1 and 2. There is not only a planning model for an aeromechanics shop, but also scale models of machinery and equipment for other kinds of shops including a home workshop.

One of the ***instructional*** aids is illustrated in Figure 2, showing a window shade with a labeled drawing of the parts of a plane. Other devices may be seen in the foreground and background.

The planning area included in the library is also an ***instructional*** aid. In Figure 3 may be seen a drawing board and stand with an attached light. Drawing instruments are kept in a nearby cabinet not shown in the picture. One may also note the chalkboard with the ***perspective*** teaching aid shown.

The department also provides, a mimeoscope, available to students for preparing instruction sheets; a chart rack, for displaying flip-over charts that may be used by students in professional classes and in student teaching assignments; a fluid-process hectograph machine; an ozalid-process printing machine; a 35 mm. Kodak camera, tripod, light meter, flash attachment, and floodlights, to be used in work on studies that involve photography; a

Fig. 2. Teaching aids on shop planning. Window shade at top shows aid used in woodworking shop for acquainting students with use of the plane

slide film projector; a large number of slide films that have been developed or purchased by the department; a Pentron wire recorder radio-phonograph, for use by students in student teaching assignments and in committee work; and recordings of significant speeches.

Most of the aids and devices now on display were furnished free of charge by students, teachers, and manufacturing concerns. The latter were especially helpful in supplying charts, diagrams, and films on various subjects.

The teaching aids library includes a photography and sound room where teachers preview slides, slide films, or listen to recordings.

To extend the teaching aids library other services have been planned, such as kits of tools for loan to students and faculty members for home use, a workbench and hand tools for use in the library, and a lending system whereby the library may be used by teachers from out of town and out of state.

The library is one of several to be found in teacher education institutions. No doubt others would provide such services if interest was shown by students, faculty, and alumni.

Fig. 3. Teaching aids for drafting area. Aid for teaching perspective drawing is shown in background

— Photographs by Denton Craley

Organizing the Industrial-Arts Program for a High School

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Director of Industrial Arts
Milwaukee, Wis.

In most of the larger cities of the nation and many of the smaller communities, the demand for new schools is of utmost urgency. Cities are desperately trying to catch up to a school population that has grown rather rapidly during the past decade. The decade has also seen advances in technology and in industrial *know-how* which surpasses any previous age. With this great industrial expansion, there has also come unusual opportunities for an expanded industrial-arts program, provided industrial-arts people are alert to their potentialities.

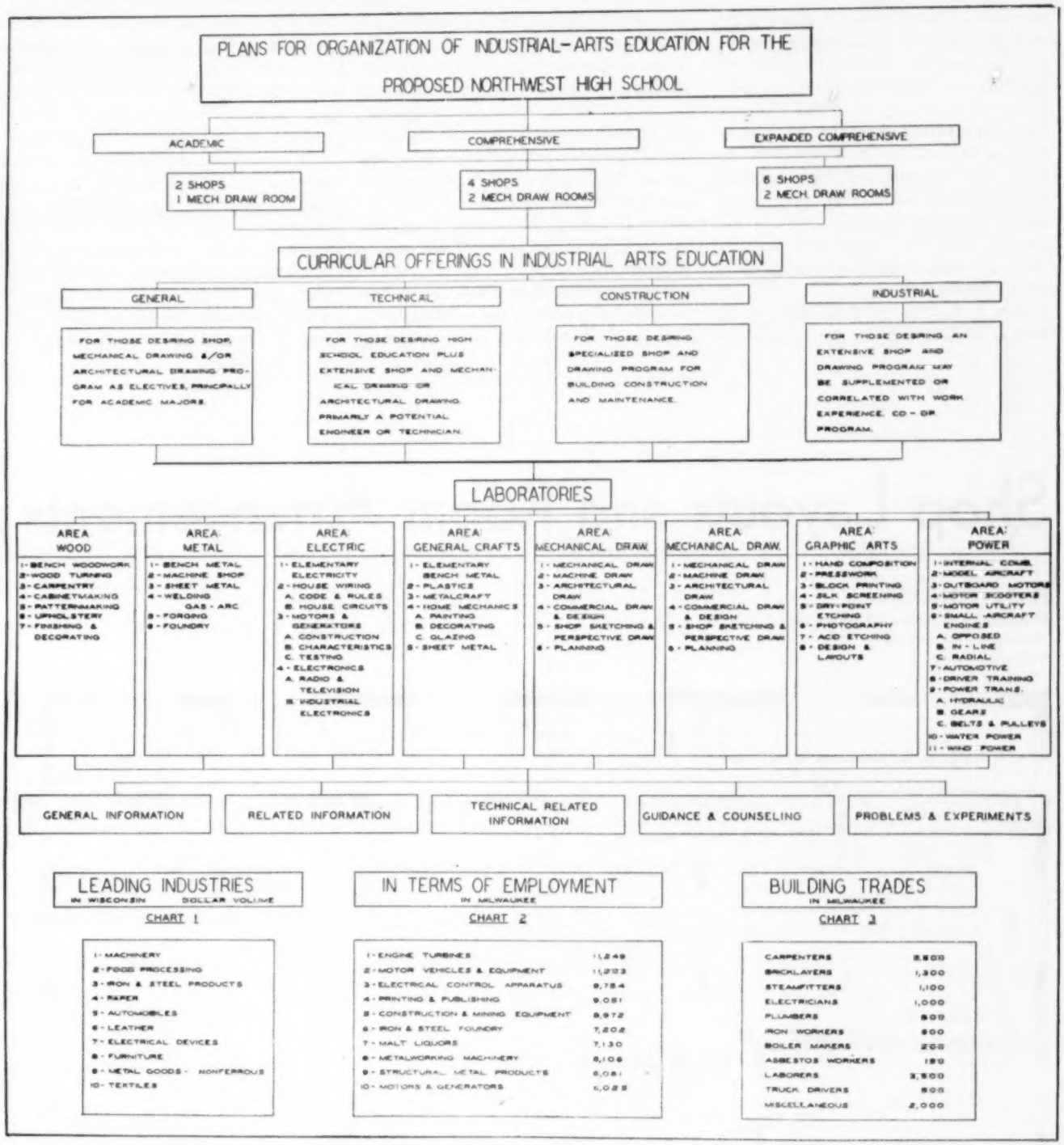
If, as an industrial-arts supervisor or director, you were called upon to hastily present a program of studies or shop plan of organization to your administration, your school board, or your community, would you know how to proceed? The accompanying chart may help you solve that problem. It is intended primarily as a preliminary administrative device, designed to assist one in selling an expanded industrial-arts program.

The chart is divided into six different steps or areas:

Step 1: Deals with the proposal
Step 2: Type of school
Step 3: Curricular offerings
Step 4: Shops or laboratories
Step 5: Related information
Step 6: Leading industries and employment figures

Step 1: This particular chart was devised for a specific purpose, to assist in planning a new high school for the city of Milwaukee. It was started before it was definitely known whether Northwest High School was to be an academic, a comprehensive, or technical high school. As the situation later developed, it was to be a comprehensive high school.

Step 2: The recommendations of the director of industrial arts and his assistant were predicated on the supposition that if it was to be just another academic high school, then two shops and one mechanical drawing room would be sufficient; if a comprehensive high school, then four shops and two mechanical drawing rooms would be the minimum requirements: and if an expanded comprehensive high school, then six shops and two mechanical drawing



Organization chart

rooms would be necessary. The term *expanded comprehensive* is used by the writer only to indicate the possibilities in a program of this kind. It may be interesting to note in passing that the school board designated Northwest as a comprehensive high school, and accepted the recommendations for the six shops and two mechanical drawing rooms. Plans for the new building are now being drawn.

Step 3: The third step in the recommendations was the proposed curricular offerings. There are four general courses designed to meet the needs of students coming from a cosmopolitan area desiring an industrial-arts program geared to meet their particular interests. These courses have been designated as general, technical, construction, and industrial. A brief explanation of each is outlined on the chart.

Step 4: The fourth category deals with

the shops or labor tories. In planning the shops the aim was to make them multiple-purpose shops, to accommodate either unit or general comprehensive classes.

Step 5: In a program of this kind provision for related information is as necessary as the manipulative phases of the work. The opportunities for integration and correlation with other subjects has never been fully explored. Perhaps this program offers that opportunity. In addition, a strong counseling and guidance service is essential.

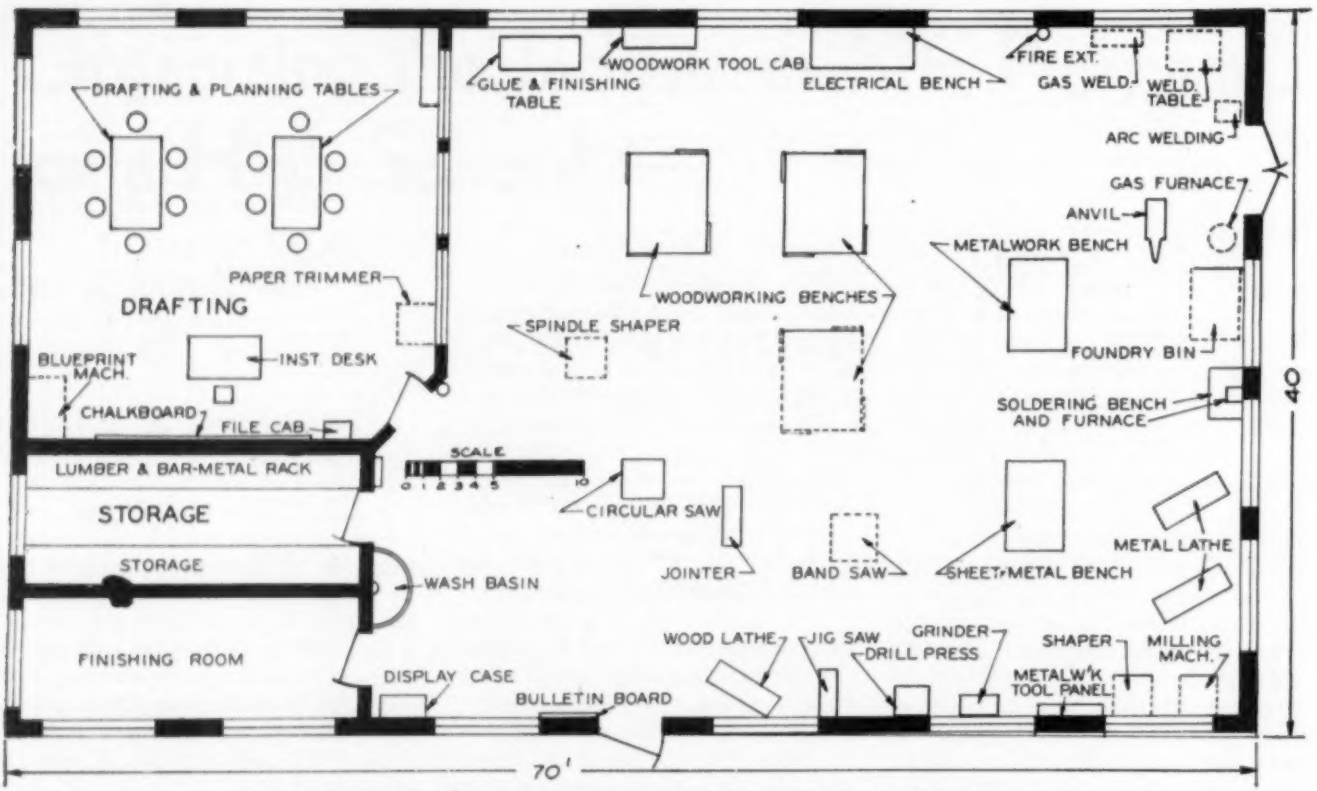
Step 6: Finally, the three tables at the bottom of the chart are very significant. In Table I the ten leading industries in Wisconsin are listed according to their per dollar volume in output. The second table indicates the number gainfully employed in the ten leading industries in Milwaukee. It may be well to announce that these figures are for the year 1949, and that present employment in these industries may be considerably higher. It may also be possible that the sequence may have changed due to the stress of the present emergency.

The last set of figures lists the workers gainfully employed in the building industry. If it appears that some trades are not represented in the chart, it may be that the number employed in those trades are comparatively small, and were included in the miscellaneous column. These figures were checked with the Association of Commerce and the Federated Trades Council.

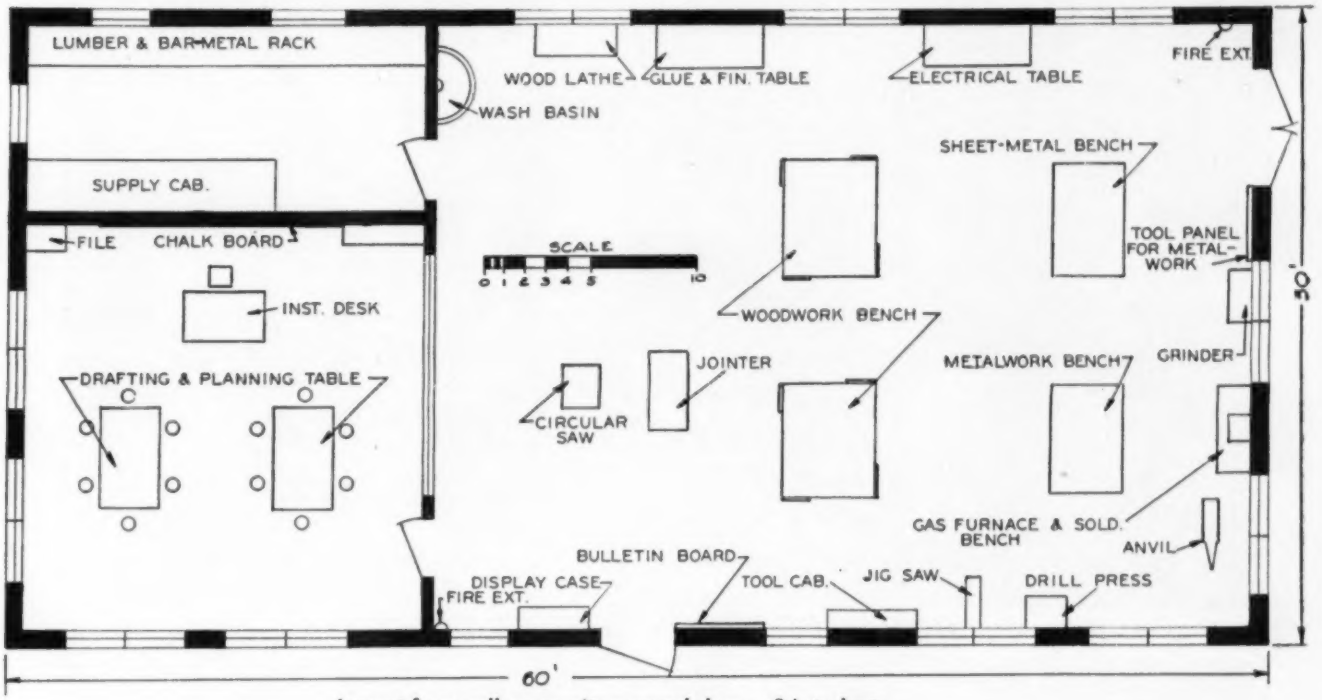
In conclusion, one of the values of a chart of this kind is that one can present graphically what it would take many pages to explain in writing. It is by no means the only way of presenting a program of this kind, and the writer has discovered that were he to do it over again, he would make some changes, and like a pragmatist, if it worked, he would use it.

Shop Layouts and Room Arrangements

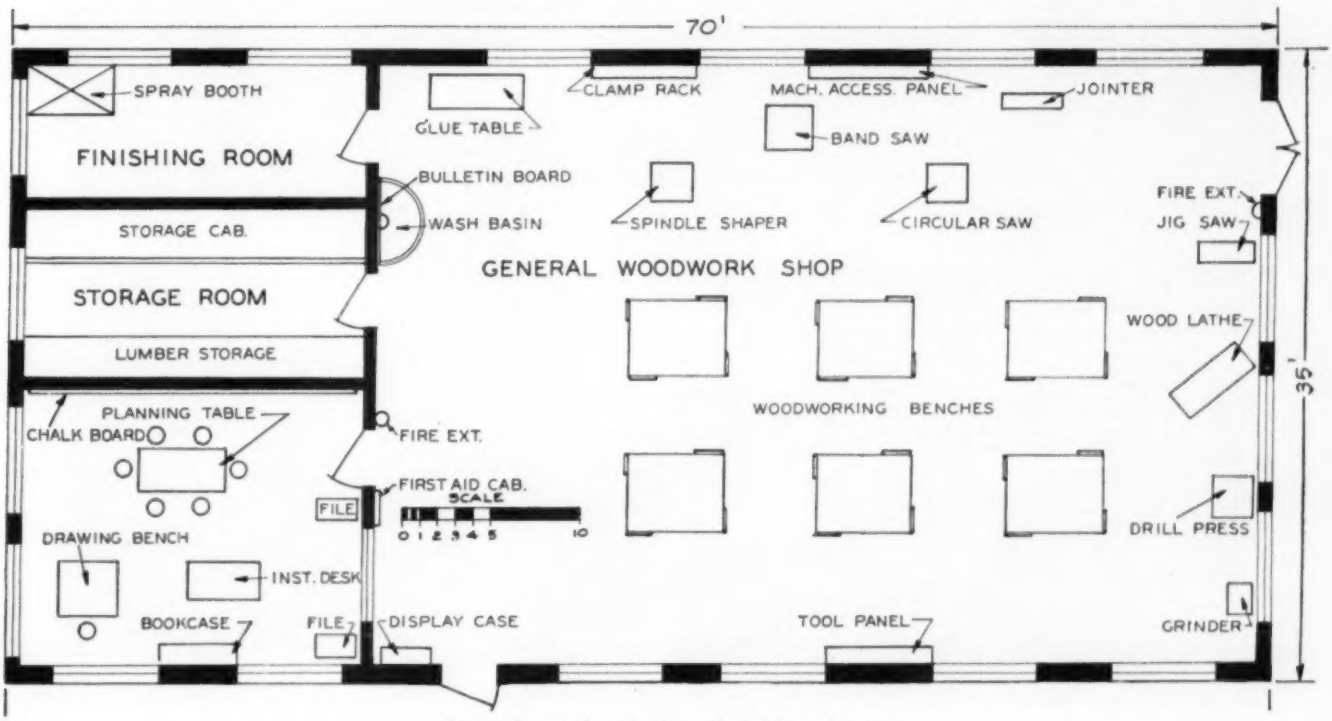
H. H. LONDON
Professor of Industrial Education
University of Missouri
Columbia, Mo.



Layout for large composite general shop — 24 to 30 students.
Activities: drafting and planning, metalwork, woodwork, and electricity

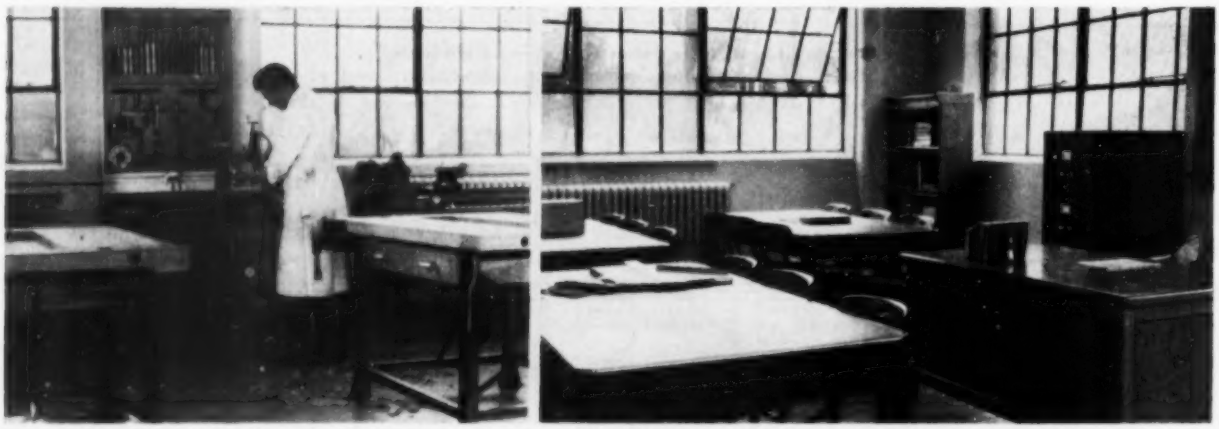


Layout for small composite general shop — 24 students.
Activities: drafting and planning, metalwork, woodwork, and electricity

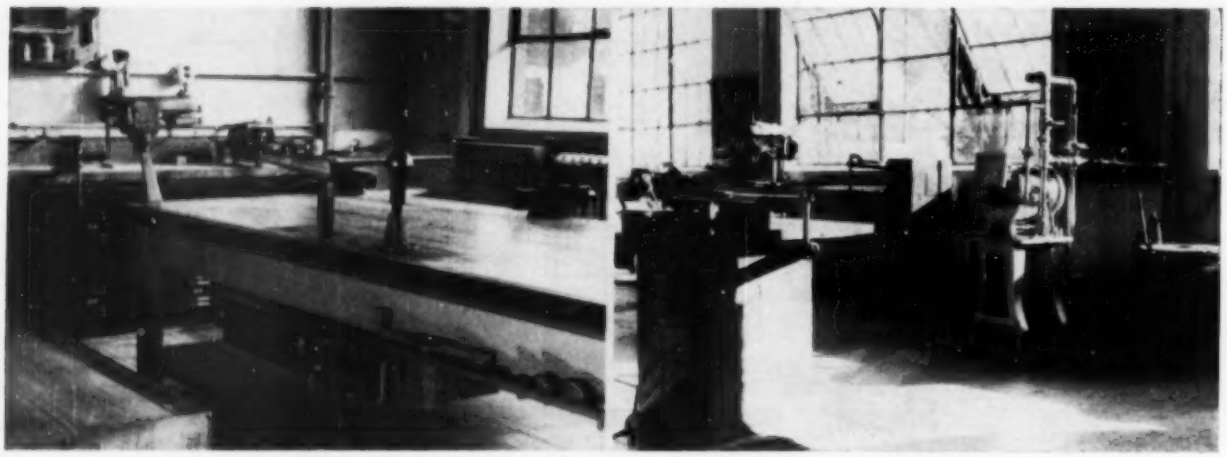


General woodwork shop for 24 students

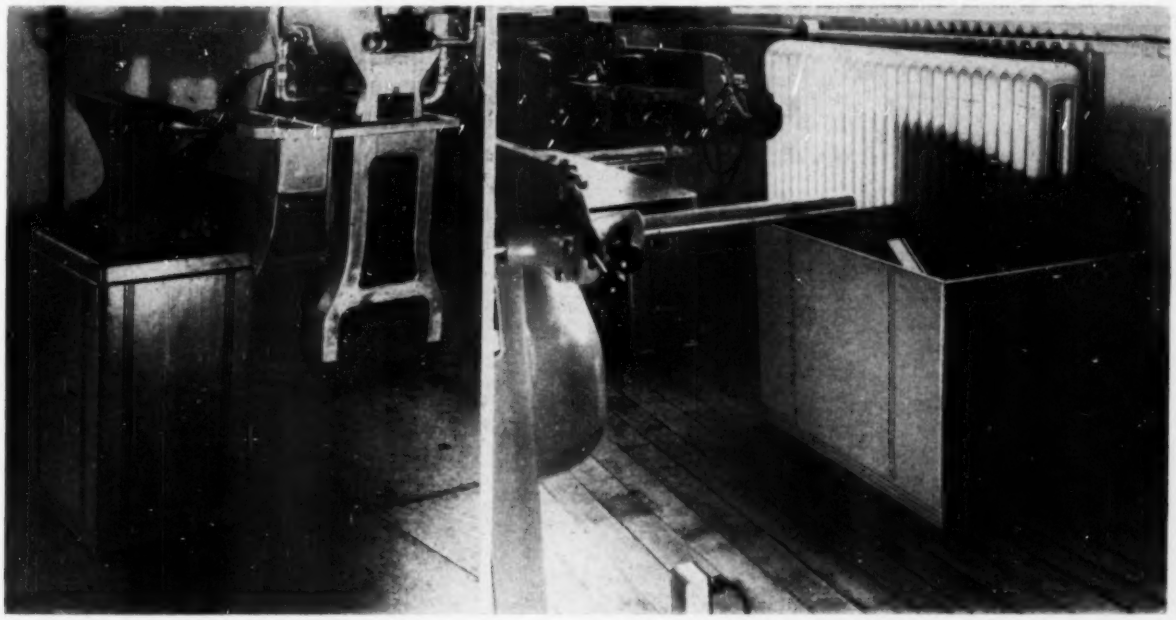
General shop, University of Missouri east end



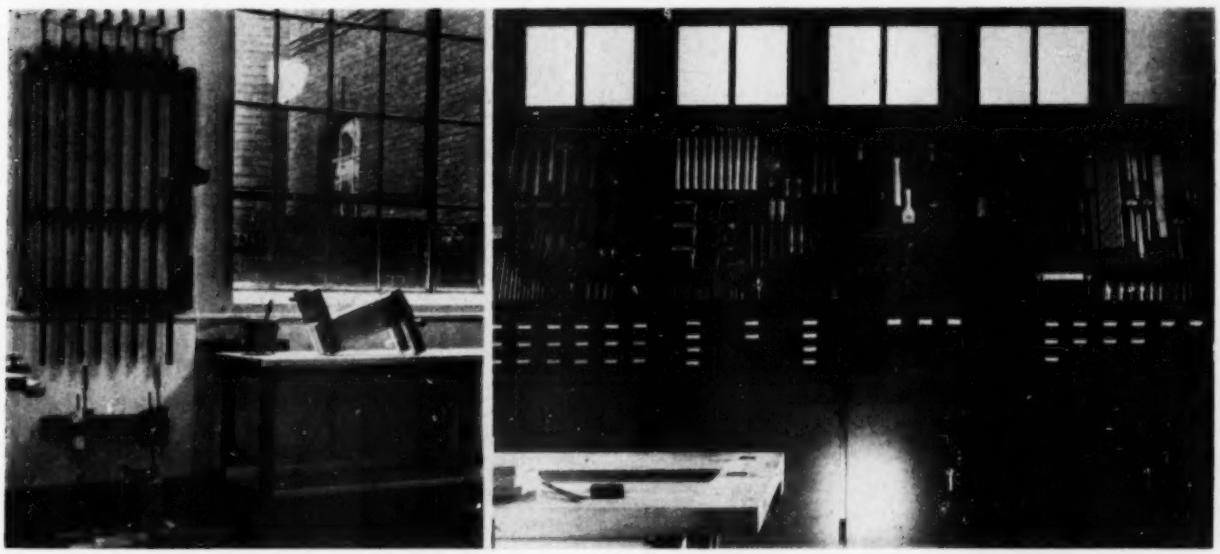
An idea on tool racks and panels to get tools close to areas of use, open type. (at right) Shop library, drawing, and planning room



Home-made metalworking benches costing less than one half of commercial benches. (at right) Hot metals area of shop with ¼-in. transite covering on wood floor. In use ten years and still like new



Idea on an attractive anvil base, filled with sand to give weight and deaden sound. (at right) An attractive scrap wood box. Outside painted green, inside yellow



Simple, attractive, inexpensive clamp racks. (at right) Tool and storage cabinet, open type

PROGRAM OF TRAINING FOR ORNAMENTAL HORTICULTURE

SEYMOUR CARREN
Lindsey Hopkins Technical High School
Miami, Fla.

Ornamental horticulture has a definite place in vocational education. Many have realized the importance of such training. The florist, nurserymen, and other related fields have responded in great numbers to programs of this type. The completion of this course would require a full four years of vocational training. In conjunction with this course it is suggested that a training program be conducted whereby the student would, during an allotted period, serve as an apprentice to a neighboring, established nursery or florist shop, or under the guidance of a tree surgeon. If the theory taught in school is followed through, this added training should provide the student with an excellent foundation enabling him to be an asset to his future employer upon leaving school. The basic requirements for this program are as follows: All science courses offered should be placed within the program. An elementary and advanced botany course is very beneficial. Business English, business mathematics, bookkeeping, and other commercial courses pertaining to business should be employed. These courses should be emphasized in the program as electives, along with the courses needed for high school graduation. In the organization of the program it is advisable to get the cooperation of all the trades people in the locality. The state colleges and horticul-

tural societies will offer a great deal of assistance. Material can be obtained from the American Horticulture Society, Washington, D.C., and the Department of Agriculture. There are several associations which have been organized for the betterment of their members. They are as follows: The American Nurseryman's Association, Washington, D. C.; The American Society of Florists & Ornamental Horticulturists, Chicago, Ill. Within each state there are organizations to help native members. The state colleges offer an extension service to aid the state in the solution of its problems.

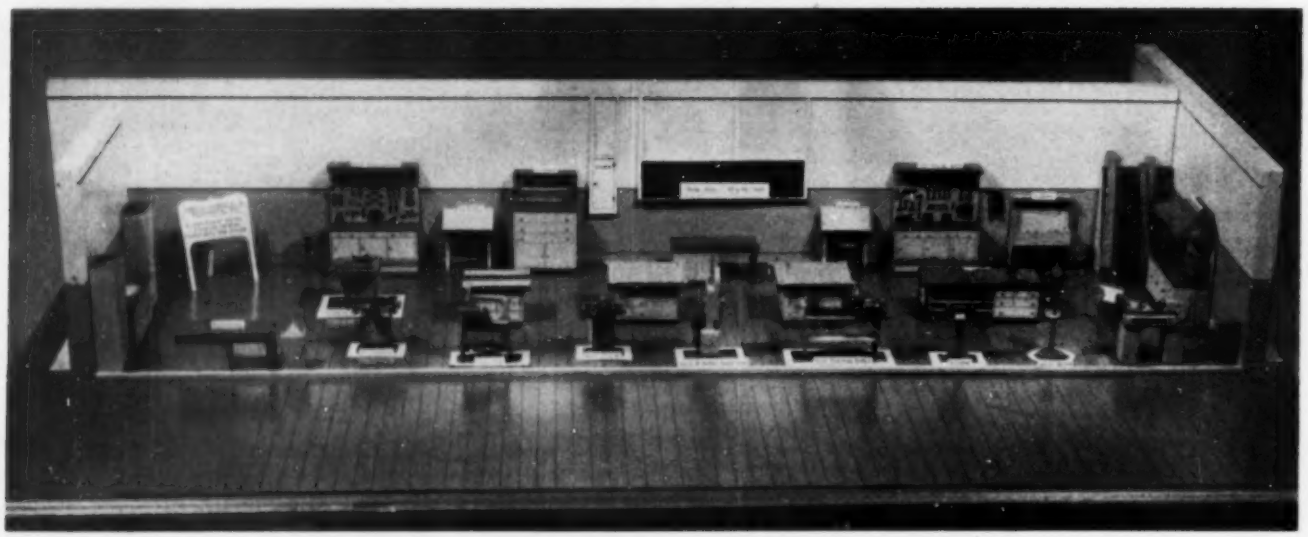
OUTLINE – Ornamental Horticulture

I. Plant growth
  A. Necessary factors
  B. Plant propagation
    1. Reproduction through all phases and methods
    2. Soils
      a) Understanding properties of soil, type, and make-up
      b) Function
      c) Chemical analysis and soil testing
    3. Diseases and insects
      a) Prevention and control
II. Nursery management
  A. Commercial plant material
  B. Identification and propagation of all plants used in the vicinity
  C. Planning of nursery
    1. Construction of facilities
    2. Equipment and materials for operation
    3. Business aspects
      a) Wholesale
      b) Retail
      c) Other promotions and outlets
    4. Maintenance and working schedule
III. Commercial floriculture
  A. Retail flower shop
    1. Commercial floral design
    2. Business aspects
  B. Greenhouse management
    1. Construction of greenhouse facilities
      a) Operation and equipment
    2. Schedule of planting
      a) Raising of major and minor cut flower crops
        1) Propagation of foliage plants

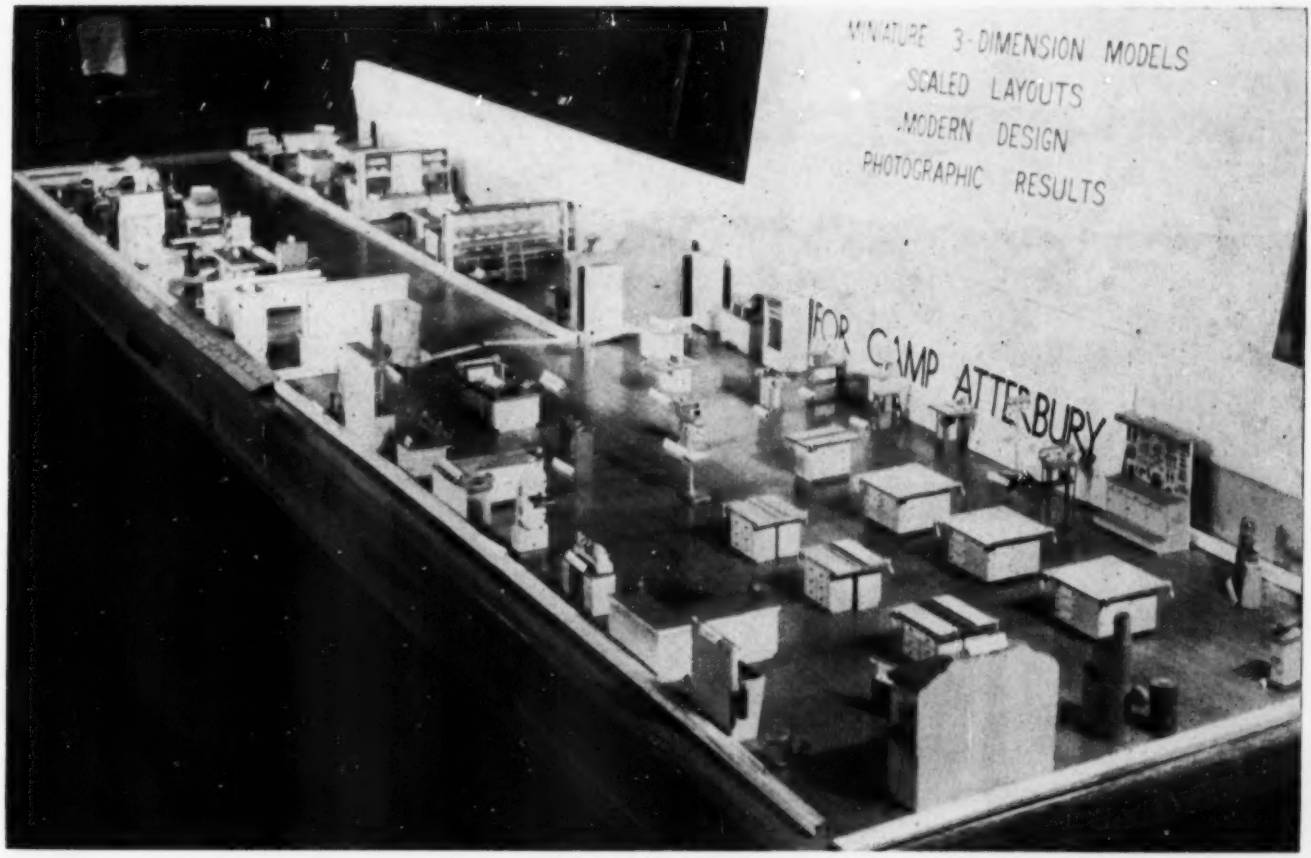
This outline can be enlarged with additional courses as faculty and equipment become available to the school. This type of training will prepare the student for a position as greenkeeper, cemetery superintendent, orchard man, greenhouse grower, nurseryman, or florist. The tradesmen of each locality specialize in a different crop. Therefore, if the student were to be interested in rose culture, he would go to a grower of excellent roses. The student should take advantage of the slack summer season to gather much needed working experience. A certificate should be designed for distribution among the students who have passed all the required courses satisfactorily.

Shop Layouts Made With 3-Dimension Models

F. C. FINSTERBACH
Plainfield, N. J.



Woodworking Shop, Catholic Central High School, Steubenville, Ohio



An extensive layout

Layout for general shop, El Monte, Calif.

Workshop layout, Danbury, Conn.

What Price Industrial Education

TOM HIPPAKA
Professor of Industrial Education
Iowa State College
Ames, Iowa

"If a nation expects to be ignorant and free, it expects what never was and never will be."
THOMAS JEFFERSON

In spite of Mr. Jefferson's grave warning issued many years ago when this great country was in its initial stages of becoming a democracy, we find America facing one of its greatest crises, if not the greatest, in the history of her educational system.

Our present educational crisis has many ramifications. Especially in recent years, teachers have continually left the teaching profession for more lucrative opportunities in other fields. Even the recruitment of teacher timber has been anything but successful, so that the enrollment in our teachers colleges is far below what it must be if schools are to be adequately staffed. School plants are so inadequate that ten billion dollars worth of school construction is urgently needed. It has been estimated that it would take no less than 300,000 classrooms, shops, and laboratories to remedy this critical situation. Coupled with these serious shortages which have prevailed for too long a period of time, and for which the youth of America have paid too dearly, there has been a tremendous increase in our birth rate. For several years now, between three and three and one half million youngsters have been born in this country annually. In the fall of 1951, one and three fourths million additional children entered our schools. Until 1960 the average yearly increase in enrollments will amount to approximately one million pupils. Our inadequately equipped schools are literally bulging at the seams.

While the seriousness of the situation in our high schools is not to be taken lightly at the present time, the flood of humanity is even greater in our elementary schools. Soon this flood stage of youth will move

into our high schools. Sometime ago, Dr. Frank Crane gave us this pungent observation:

I have just been graduated from the high school. . . . I am supposed to be educated. The city provided me for some years with skilled teachers and expensive apparatus of all kinds. I will tell you a few things I don't know.

I am halfback on our team and know the quirks of passing the ball but I don't know how to build a woodshed or shingle a roof.

I can prove that the square of the hypotenuse is equal to the sum of the other two sides, but I don't know how to hang wallpaper, put in a pane of glass, or paint.

I have taken fifty lessons in chemistry, but I don't know enough to keep alcohol out of my system. I know nothing of food values and gorge myself on what pleases my palate.

I was educated according to the ancient formulas for producing a scholar and a gentleman and find that I must work for a living. I have no taste nor love for hard work, no habits of saving, no disposition to resist temptation, and no skill in doing anything the world is willing to pay for. I am wholly untrained for efficiency and before I make good I will have to undo most that has been done to me in school.

Beset with problems arising from all directions, as educators we might very well take seriously Abraham Lincoln's adage:

If we could first know where we are and whither we are tending, we could better judge what to do and how to do it.

There needs to be a constant and continuing process of appraisal through well-planned and well-executed research if our school programs are to be purposeful ones. Hindsight as well as foresight are important. The implications of Dr. Charles Prosser's resolution should never be lost sight of if we are to provide ample educational opportunities for all youth. We must put our own house in order if we are to expect more favorable public opinion toward education, followed by greater financial support from the public. Money is the crying need in education; the fundamental need is as simple as that. We must see ourselves and our efforts as our school patrons might well see us. As teaching staffs, are we agreed on sound educational aims for our respective schools, and do we adhere to them faithfully? Do we really know what the problems and needs of youth are? What do parents expect of us? Are business and industry satisfied with the product of our schools? How does labor feel toward us? Are technical schools, colleges, and universities satisfied with our efforts? There will be times when these school patrons will disagree with us, and they will be right. In such circumstances we must be quick to remedy a situation. Then too, there will be times when the taxpayer is wrong; concerted effort on our part to show him that he is wrong is then imperative. There are times when we as educators insist upon certain aims, methods, and outcomes, and we do so as a staff because we are the educational experts in our community. If we know pupil needs and plan in terms of those needs we will seldom go wrong in our calculations.

When we are certain that our own house is in order, we can be just as sure that our product will be a good one. Youth will have health, emotional control, good citizenship qualities, character, ability to earn a living, and something of the spiritual. He will be a well-balanced individual, the kind that we must have if our democracy is to survive.

In education the lack of money is our *greatest evil*. Our schools are not receiving the financial support that they must have. Democracy thrives on an educated citizenry for its very survival. Any nation that does not have a good sense of values, can very well be headed for trouble.

We Must Look to Our Salesmanship

The plain truth is that we have not sold education to the American people to the degree that it deserves to be sold. We can boast of our educational system being the greatest in the world, which could very well be true, but in view of our other expenditures, education is not getting its necessary share of our national income. Russia is spending a greater percentage of her national income than are we on her type of education to promote an ideology which we despise.

To aggravate our situation still more, the tax dollar is getting a terrific slicing. Aggressive pressure groups of various kinds are making their demands felt, and the thin slice for education is in constant jeopardy of becoming even thinner. Here again, youth is paying the price.

In the face of our many aggravations, there is ample proof that Americans generally find money for the things that they want. In fact, there are some manufacturers who literally boast of a lucrative business in products that people neither wanted or needed in the first place. The want was created through uncanny salesmanship which smacked of falsification. And still, the very business, that of education, which will ultimately preserve our democracy, takes a back seat in our sense of values, when it comes to the wise expenditure of the American dollar. We need to look to our salesmanship if our youth are to get a fair deal.

We in the field of education are in a very respectable business. It was Daniel Webster who wrote:

If we build with marble it will perish. If we build with brass, time will efface it. If we rear temples they will crumble into dust, but if we build with immortal minds; if we imbue them with principles, a just fear of God and a love of our fellow men, we engrave upon those tablets something that will brighten to all eternity.

There are times when we minimize our own importance, for nobody works with such valuable materials as does the teacher. Truly we need to realize the worth-whileness of our endeavors not only to the student, but to the community and nation in general. Education has to do with the growth of human beings, and that in itself constitutes the foundation for a good sales talk.

It is through better salesmanship in education that our youth will finally get the schools they so richly deserve. There is no royal road to success in this all-important endeavor. Success will crown our efforts if our salesmanship is based upon such essentials as good public relations, a well-informed public, purposeful course content, staff members with personal integrity and unity of sound purpose, good teaching methods, genuine enthusiams in teaching, a knowledge of youth, and an awareness of the demands made upon them by society. We will be successful in our salesmanship because people will believe in our product as well as in us. Not until then will the necessary funds so desperately needed in education be forthcoming.

The process of selling education to the American public must be concerted on the part of educators; it must be concentrated and continuous. Hitler believed this so passionately that he was sure that people would ultimately believe a lie if it were told them often enough and long enough. Our difficulty is that we believe that if a truth is told once, people should accept it as such and readily loosen their purse strings to support the concept. This is not necessarily so, even where the enterprise is as legitimate and as far reaching as edu-

cation. Even the truth has to be told with regularity over and over again before the telling brings results. Certainly we do not need to resort to untruths even if we were so inclined, in order to formulate sales talks for the purpose of selling education.

As we endeavor to sell education, we must remember that no school enterprise will advance any faster than the taxpayers have been educated to move. We get into difficulty when we are too far behind our public, or too far ahead in our procedures. After all, it is the citizen taxpayer who provides the finances with which we repair, construct, equip, and staff our schools. He is our employer. He wants to know what we propose to do with his hard earned money, and he wants reasonable returns on his investment. Educating the public is our number one problem, and people in America must be made to realize that there is a serious crisis in education. Americans generally respond intelligently when sufficiently informed. This must come to pass in the present educational dilemma if we are to avoid very serious consequences.

Selling Our Industrial Education Program

Turning to industrial education, it is most obvious that the financial drought has struck us so seriously that it can well be viewed with alarm. Apparently we have all the difficulties of the other areas of education plus a few peculiar to our own field. Industry pays well, and schools cannot compete with industry. Consequently, the teacher shortage is especially critical in our area. Shopwork requires costly equipment due to the very nature of such activity, and communities often feel that equipment costs are prohibitive. Materials of instruction add very substantially to the total cost of the program. Where shops are constructed, the size of an ordinary classroom will not suffice. Due to equipment, storage, and physical activity, shops must be much larger and consequently they involve more financial outlay than the average classroom. However, in the face of these difficulties there is much that we can do to promote our work and even succeed in securing additional shop space, equipment, and staff.

We too need to resort to self-appraisal at all times, constantly examining our programs in the light of a fast moving industrial era. What must we do in order to gain greater support from the public for our program, financially and otherwise? Let us examine a number of the measures that could very well be taken by us in industrial education if we are to gain the necessary financial support and forge ahead with our programs:

1. We need to spread the gospel that only the productive can be strong, and only the strong can be free. In our field we teach people to produce, whether in time of peace or war. The nation which can transform its peacetime economy, including its production, into a wartime economy without going into an economic tailspin is the one that wins a war, provided that that nation is also bolstered by moral and spiritual strength.

2. Are we in agreement as to the very vital relationship between industrial-arts education and vocational-industrial education? Both are important; both make a unique contribution; together they constitute the field of industrial education. Industrial-arts education is a vital part of general education, while vocational-industrial education prepares people for a specific trade. Where we cannot agree on such matters, taxpayers lose confidence in us, and naturally they tighten their purse strings accordingly.

3. There are those who take industrial-arts education to augment their general education. Often, these people are going to college, and early entry into a wage earning occupation is not a problem.

4. For many of our boys and girls high school constitutes their last formal school experience. They have a right to expect that graduation from high school will have prepared them for entry into a wage earning occupation. Early entry into a wage earning occupation is a necessity, a very real problem to many of our youth. We cannot and must not ignore it.

5. As teaching staffs, do we really work as units? Are school policies established through democratic group action? In developing these policies are we willing to submerge our own feelings for the good of the school? When such policies have been established, do we really support them wholeheartedly as individuals?

6. Does the school system have a citizen's committee and the vocational-industrial education program an advisory committee? Prevention is still the greatest cure for school crises. Real co-operative effort on the part of school staffs and advisory committees prevent crises from arising. These committees can well be a sounding board for the teaching staff, helping the latter to formulate intelligent, workable, and acceptable community school policies, cutting criticism and consequent community friction to a minimum.

7. How well have we established in the minds of both youth and adults in our respective communities the understanding that the schools belong to them, not to us alone? Misuse and mutilation of school property cease to exist as we succeed in this important venture.

8. As staff members, are we in constant touch with industry and labor? Do we know what their problems and controversies are? What is it that they desire from us? Only then can we make our programs truly purposeful. Employers do not hesitate to tell us what youth must have in order to be employable. They must possess a desire to work; have some marketable ability; be willing to put forth an honest day's work; show a willingness and a capacity to learn on the job; get along with others; and come possessed with good character qualities.

9. Are we teaching with transfer of learning in mind? Before we can do this we must certainly acquaint ourselves with the demands of our highly competitive industrial society.

10. Parents have a right to expect that their youngsters bring home worthy fruits of their efforts from our shop classes. After all, materials cost money, and there should be some physical as well as mental evidence of the workmanlike utilization of these materials.

11. Is there a well-organized plan whereby every student contributes to the orderliness and upkeep of the shop? Does each student understand that these tasks constitute an important part of his citizenship responsibilities? Each student should realize that his efforts tend to make the shop a more pleasant place in which to work; where he can get more done in a minimum amount of time.

12. Are our students safety conscious? Do they realize that they are responsible for the safety of others as well as themselves? Is instruction in safety an important part of every shop course?

13. Do we guard against the possibility of setting up more activities than our staff, equipment, and space will permit, thereby jeopardizing the real worth of our basic courses? Obviously it is much better to do a good job in a reasonable number of

courses than it is to do a haphazard job in a larger number of areas.

14. Are we really offering young people the useful and often the difficult subject matter which they need? Or have we allowed course work to degenerate into having fun, or doing most anything at most any time, forgetting that there are fundamentals to every worth-while activity? Possibly we are guilty of teaching those subjects which we know best and which take very little preparation on our part. Then too, we may be blamed for offering such subjects as entail so little cost that we do not have to put up a fight to secure the necessary supplies, equipment, and shop space. Do we possess the necessary drive to establish well-equipped automotive shops, with driver education courses, hoping to cut down the terrible accident and death rate on our highways?

15. Have we convinced the public that classes of 25 students are large enough, and that our teachers should have reasonable time for class preparation and shop maintenance?

16. As administrators do we afford each teacher the necessary consideration and even protection from miscellaneous tasks in order that he can do a good job of teaching, which after all is his primary duty?

17. In developing an exploratory program, are we spreading activities so thin that the student gets very little, or nothing in the way of project satisfaction from his experiences? Our way of life is too jumpy now, and schools should not be a party to further aggravation in this regard. Furthermore, students may acquire the wrong attitude — it can well be one of disrespect for a craft in which intelligent men of integrity make an honest living. A sensible balance between knowledge, skills, and attitudes should be our goal, even in a tryout program.

18. While there is no substitute for skills, are we so skill minded that nothing else matters? We need to remember that more people lose their jobs because they cannot get along with their fellow men, rather than because they lack job skills. Let us not forget that while we are developing a skilled craftsman in a vocational program, some day he will be a member of a union or find himself an employer of men. As a worker, or as an employer he must give of his time, energy, and even money, to preserve this democracy of ours. It is imperative that as educators we recognize our double-barreled responsibility to develop in others citizenship qualities combined with craftsmanship, and we must do something about both. Many years ago Dr. George Kerschensteiner clearly prescribed our responsibilities in these words:

> Everyone must be able to do some good and thorough work though it be of the simplest kind, of one sort or another. Not till then will he be able not only to satisfy his fellowmen and be of use to his country, but also to make his own life of value to himself. And in the same measure as our lives gain value for ourselves do we attain power to reach a higher stage of culture.

19. Do we possess the wisdom and the integrity to justify the purchase of substantial equipment primarily for instructional purposes and not for school and community production work? The latter may be worked in where it can be conveniently done and when it is educational in character.

20. Where we already have a shop program in a school, are we making maximum use of all of our space and equipment before we make further requests of the school board? If we are, do taxpayers know this? It ought to be made clear to school patrons that we are adhering to a certain curriculum because our equipment and facilities do not permit us to do more. Possibly we ought to have another curriculum showing the taxpayer what their youth should have and could get if we had ample shop space and equipment. We might even be in a community where employers are asking for a certain type of worker, but due to our inadequate facilities we can help neither the student nor the employer. If we have facilities for teaching mechanical drawing are we also teaching home planning? Every boy and girl is a prospective home owner, home builder, or home renter, and they ought to know something about living quarters. Where we have a woodworking shop are we teaching patternmaking? This could be done with very little additional equipment, and certainly patternmaking is basic in our technological system.

21. As we request additional shop space are our requests substantiated by a sound survey of youth needs in our respective communities? Do we know what we want, and why our young people must have these facilities?

22. Have we built up workable public relations in the community which will serve us in good stead as we go to the public for financial support?

23. In planning our shops do the plans reflect common sense, economy, knowledge of drafting, acquaintance with materials, familiarity with equipment, respect for the safety of others, and some mastery of building codes?

24. Do we possess sufficient courage to insist that youth must have modern equipment if they are not to be cheated in this business of preparing themselves to cope with competition in a fast moving world? Have we been able to convince the taxpayer that it is good business to purchase substantial equipment in the first place, and to teach youth to use it in a workmanlike manner, and to give it proper care?

25. Do our graduates make good after they leave our schools? Some go to institutions of higher learning, while others enter technical schools. Most of them enter a wage earning occupation. What do employers say about our product? The proof of the pudding is in what our graduates are able to do after they leave us. Follow-up of our graduates certainly brings to light the strengths and weaknesses of our efforts.

We have come a long way in our American schools toward the organization of a more diversified offering, leading to the all-round development of our youth, yet there remains much that must still be done. A sound educational program culminating in a good school product always enhances our public relations, and makes the selling of education easier and more remunerative. In this modern era the means for selling education are numerous. We can very well have access to the same devices and mediums generally utilized in the business world. Radio, the press, and now television are often ours for the asking if we will but employ them. Continued and intelligent improvement in the soundness of our programs, the constant enhancement of our public relations, and the improvement of our salesmanship in education, lead to greater public financial support. Let us hope that the day cannot be too far distant when we will have taken the pungency out of Ralph Waldo Emerson's indictment when he said:

> We are students of words; we are shut up in our schools and colleges and recitation rooms from ten to fifteen years, and come out at last with a bag of wind, a memory of words, and do not know a thing. We cannot use our hands, or our legs, or our eyes, or our arms. . . . In a hundred high schools and colleges, this warfare against common sense still goes on.

Vocational Training for Hotel and Restaurant Workers*

C. E. HIGHLEN
Assistant Professor
Trade and Industrial Education
Purdue University
Lafayette, Ind.

and

BENJAMIN J. NOVAK
Murrell Dobbins Vocational-Technical School
Philadelphia; Supervisor of Graduate Research in Vocational Education, Colorado A. & M. College, Fort Collins; and Lecturer in Vocational Education, Temple University, Philadelphia

The hotel and restaurant fields are today among our most important and extensive enterprises. According to reliable estimates, the restaurant business in this country employs more than three million workers. The hotels employ close to a million. The occupations represented are many and varied. They range from managerial to unskilled levels, with many intermediate gradations.

There is abundant evidence indicating an urgent need for organized training in order to develop efficient personnel. Other than haphazard on-the-job or similar *pick-up* methods, little systematized instruction can be found. Several universities offer training in hotel work intended for the executive, managerial, and other highly skilled occupations.

Many of the hotel and restaurant positions call for relatively simple skills which can be learned readily and efficiently on-the-job. There is a sizable group of skilled occupations, however, of less than college grade, for which the public vocational schools should be able to provide training opportunities, but thus far have done little.

The Atlantic City Survey

Atlantic City, N. J., is a famous resort center, with more than 200 restaurants and approximately 415 hotels, together employing about 25 per cent of the local labor force. The vocational program in Atlantic City currently includes training for chefs and bakers, along with courses in other vocational fields. The need of expanded service in restaurant and hotel work has been felt keenly for some time. The kinds of services and the direction which they should take have not been clear.

In order to define accurately the training needs and requirements, the decision was made to conduct a survey of local hotels and restaurants. The managers of 24 hotels and 50 restaurants were interviewed, and data compiled on specially devised check sheets. The establishments represented a range of sizes and types. The hotels varied from a room capacity of less than 100, to one with 1000. Restaurants ranged in seating capacity from 20 to 3000. Too much cannot be said for the care, expenditure of time, and cheerful cooperation displayed by everyone approached in the survey.

Information was requested on: (1) the kinds of payroll jobs and the number employed in each job; (2) employment requirements; (3) areas of training desired for the preparation or improvement of their workers; (4) payroll jobs which should be included in a vocational training program.

The Hotel Survey

Payroll Jobs: The data from the 24 hotels showed the large total of 5255 employees distributed among 146 different payroll jobs. The jobs may be grouped under the following main heads:

1. General administration (2 payroll jobs)
2. Accounting (6 payroll jobs)
3. Front office bookkeeping (70 payroll jobs)
4. Rooms (9 payroll jobs)
5. Housekeeping (13 payroll jobs)
6. Service (12 payroll jobs)
7. Food preparation (29 payroll jobs)
8. Cafeteria (8 payroll jobs)
9. Dining room service (8 payroll jobs)
10. Room service (4 payroll jobs)
11. Warewashing (6 payroll jobs)
12. General (9 payroll jobs)
13. Beverages (7 payroll jobs)
14. Laundry (15 payroll jobs)
15. Athletic and Social (5 payroll jobs)
16. Telephone (1 payroll job)
17. Miscellaneous (5 payroll jobs)

Some of the payroll jobs were unusual, and were reported in only one or two of the hotels.

As might be expected, the largest number of persons found employment as waiters or waitresses. They numbered 1321, making up about 25 per cent of all employed in hotels, and were about equally divided between men and women. About one third of the group were colored. (The general population of Atlantic City is approximately 20 per cent colored.)

The payroll classification next in importance was cooks and bakers. They numbered 419, or about 8 per cent of the total. The employees here were almost entirely male and white.

Ranking third, fourth, and fifth respectively were maids, cleaners, and warewashers. Together they constituted almost one fifth of the total employment. The maids were almost all women, and the women predominated among the cleaners. The warewashers were chiefly men. Half of the maids were colored. They were in the majority also among the cleaners and warewashers.

Labor turnover was reported to be high in food serving and laundry working categories, but low in the administrative and food preparation fields.

Employment Requirements

For most jobs, experience was required, excepting for occupations like waiter or waitress, bus boy, cleaner, laundry worker, elevator man, or maid.

One significant finding was that the large majority of hotels required workers to be 21 years of age or over. Only a few hired secretaries, clerks, and elevator men at 18, or housemen at 19.

The education required for managers was generally college training. The majority of the hotels preferred high school graduates for positions like: waiter or waitress, cook, office work, bellman, and elevator man. The usual requirement for bus boys, porters, housekeeping, and laundry workers was eighth grade completion.

The physical requirements were general in nature. Many commented simply that they desired all of their workers to be "normally healthy." A few specified "good

*Based upon the master's thesis: "Training Needs of Hotel and Restaurant Workers" by C. E. Highlen, Colorado A. & M. College, 1948.

feet" for waiters, waitresses, and hostesses. The larger hotels require a general physical examination before employment. The New Jersey law provides periodic medical examination for food handlers.

Many managers specified that waiters and waitresses, and all personnel in direct contact with the hotel guests, have pleasing personalities, and be well groomed at all times when on duty.

Areas of Training That Should Be Provided

The areas of training that the 24 hotel managers thought should be provided by the school are shown in Table 1.

TABLE 1. Areas of Training Which 24 Atlantic City Hotels Think Should Be Provided by the School

Area	*For Beginning Workers*	*For Experienced Workers*
1. Food preparation	22	7
2. Food serving	22	6
3. Telephone	20	
4. Rooms	4	15
5. Supervision		20
6. Administration and general	2	6
7. Laundry	2	1
8. Basic hotel course	2	
9. Maintenance	2	
10. Health bathing	1	
11. Sea bathing	1	

It will be seen that there was nearly unanimous agreement that food serving and food preparation should be taught for beginning workers. Nearly all of the group felt a need of supervisory training for experienced workers. Fifteen desired training for experienced employees in matters dealing with rooms.

Several managers included remarks and statements emphasizing the importance of public and human relations, efficient supervisory techniques, and other personal attributes among workers in the hotel field.

Payroll Jobs for Which Training Should Be Provided

The representatives of the hotels were asked also to indicate the payroll jobs for which some type of instruction should be provided by the school. These data are shown in Table 2.

It is evident that the leading payroll jobs are waiter and waitress, cook, baker, telephone operator, and department head.

TABLE 2. Payroll Job Training Which 24 Atlantic City Hotels Think Should Be Provided by the School

Payroll Job	*Number of Hotels*
Food Preparation	
Cook	21
Baker	17
Pantry man	3
Relish girl	1
Food purchaser	1
Kitchen management	1
Kitchen apprentice	1
Food Serving	
Waiter and waitress	23
Food control man	1
Food checker	1
Beverage control	1
Dining room captain	1
Wine clerk	1
Telephone	
Operator	20
Rooms	
Assistant manager	15
Room clerk	13
Chamber maid	6
Housekeeper	3
Bellman	2
Parlor maid	1
Inspectress	1
Administration and General	
Cashier	10
Manager	4
Clerk	2
Auditor	1
Stenographer	1
Laundry	
Washer	2
Flat work ironer	2
Miscellaneous	
Department head	20
Hotel administration curriculum	2
Health bath	1
Life guard	1
Maintenance	1

Considerable interest was evidenced also in training for assistant manager, room clerk, and cashier.

The Restaurant Survey

Payroll Jobs: The 50 restaurants showed a combined total of 3117 persons employed in 53 different payroll jobs. Similar jobs are grouped for convenience, and the employment data shown in Table 3.

As was the case in the hotel study, the waiter and waitress group was by far the largest, employing about half of the total. In contrast with the hotel findings, women almost completely dominated the food serving jobs in the restaurant field. The number of colored persons employed as waiters or waitresses was negligible.

TABLE 3. Employment in Major Payroll Groups by 50 Atlantic City Restaurants

Payroll Group	*Male*	*Female*	*Combined*
1. Waiter and waitress	41	1453	1494
2. Dishwasher	411	12	423
3. Cook and baker	262	3	265
4. Head waiter and hostess		170	170
5. Bus boy	162	1	163
6. Manager	113	7	120
7. Cashier	3	111	114
8. Porter	84		84
9. Saladman	41	33	74
10. Vegetable man	45	25	70
11. Bartender	43		43
12. Salesgirl		19	19
13. Laundry	2	8	10
14. President	6		6
15. Treasurer	6		6
16. Vice-President	3		3
17. Accountant	3		3
18. Secretary and typist		10	10
19. Clerk		6	6
20. Miscellaneous	10	24	34
Totals	1235	1882	3117

Dishwashers, cooks, and bakers were second and third respectively in numbers employed. These jobs were filled almost exclusively by men. The dishwashers were nearly all colored, while the reverse was true among the cooks and bakers.

Labor turnover was high for bus boys and dishwashers, and was moderately high for waitresses, porters, hostesses, and cashiers.

Employment Requirements

The field offered for beginners was relatively small. Some opportunity for the inexperienced worker was found in dishwashing and food serving.

Cooks and other workers in food preparation were required to be 21 years of age or over. A relatively large number employed cashiers, bus boys, and pot washers at age 18. A few establishments hired 16-year-old girls as waitresses and for retail counters, and bus boys at the same age. Although the preference was for mature workers, the restaurants offered more opportunity for the 16- and 18-year-old workers than did the hotels.

A college education was prescribed for the highest managerial positions in the large restaurants. The majority of restau-

rants preferred the cashiers, waitresses, and hostesses to be high school graduates. Almost half employed waitresses who had an eighth-grade education. In most instances completion of the eighth grade was expected for bus boys, dishwashers, porters, and cooks. The cooks were required, however, to have additional specialized training.

The physical and personal requirements were general in nature, and similar to those prescribed by the hotels. Most specified "normal health," "good feet," and pleasant personalities for their hostesses and waitresses.

Areas of Training that Should be Provided: The 50 restaurants thought that the school should provide training in the areas shown in Table 4.

TABLE 4. Areas of Training Which 50 Atlantic City Restaurants Think Should Be Provided by the School

Area	*For Beginning Workers*	*For Experienced Workers*
1. Food serving	50	11
2. Food preparation	49	2
3. Administration	4	1
4. Telephone	1	

The restaurants are unanimous in desiring instruction in food serving for beginners. All but one expressed an interest in training for food preparation. This agrees rather closely with the opinions of the hotel managers.

TABLE 5. Payroll Job Training Which 50 Atlantic City Restaurants Think Should Be Provided by the School

Payroll Job	*Number of Restaurants*
Food Serving	
Waiters and waitresses	50
Hostess	8
Food checker	1
Food control man	1
Food Preparation	
Cook	49
Baker	49
Saladmaker	16
Sandwich maker	4
Plate dresser	2
Counter man	1
Coffee man	1
Oyster and clam opener	1
Administration	
Cashier	12
Telephone	
Operator	1

Food preparation

Payroll Jobs in Which Training Should Be Provided

The payroll jobs for which the restaurants expressed the desire for training programs by the school are listed in Table 5.

The restaurant operators were closely agreed that the school should provide courses for waitresses, cooks, and bakers. One fourth desired training for cashiers, and a smaller number desired instruction for hostesses. In sharp contrast to the hotel findings, only one out of the entire restaurant group felt that the school should furnish training for telephone operators.

Discussion

In the 24 hotels and 50 restaurants surveyed in Atlantic City, there were a total employment of 8372. About 58 per cent of the hotel workers were male, while the per cent of males in restaurant work was forty. The combined employment shows an equal ratio between males and females.

More than one third of the workers were employed as waiters and waitresses. Women made up a high per cent of the total in this group.

Dishwashers and cooks ranked next in order of numbers employed, with the males predominating.

Atlantic City has a colored population of about 20 per cent. The hotels in the survey employed 39 per cent of colored workers, while the employment in restaurants was 24 per cent.

The data obtained from the survey carry a number of implications. Although many of the payroll jobs showed a high turnover, the restaurant and hotel businesses are comparatively stable through all seasons of the year. During the winter, conventions and regular visitors provide a year-round field of employment. This stability of the restaurant and hotel fields in Atlantic City is indicative that training could be provided by the local schools on a sound basis.

It is evident that the food serving occupations should be given primary consideration in a school training program. Although the dishwasher job was second in numbers employed, there appears to be little justification for setting up a school program, inasmuch as little or no preparation is required.

Cooks and bakers rank third in employment. Increased attention to the training of this group is needed. Maids, bus boys, and cleaners were also sizable groups. Little stress, however, was placed upon training for these positions by the employers.

It is significant that the hotels expressed a preference for mature employees, most of the establishments setting 21 years as the minimum age. An important influencing factor is the state law which automatically limits the employment age to 18 for routine workers and to 21 for waiters and waitresses in establishments where liquor is sold or served. In Atlantic City only one of the larger hotels, and only the smaller restaurants did not serve or sell alcohol. Several of the latter establishments employ workers at 16 or 17 years. It would seem that a limited in-school program would be practical for this group, providing that the numbers are kept within the local employment needs.

Most of the establishments surveyed indicated that experience was a prerequisite for employment in all but jobs requiring little training. Judging from the interest expressed by the administratives interviewed, it is likely that beginners would be considered favorably if they were the graduates of an adequate hotel and restaurant training program in the school.

It is noteworthy that the hotels desired high school graduation for employees who come in contact with their guests. A training program for these workers should probably be on a basis leading to a high school diploma, or as post high school work.

Food merchandising

Aside from the legal health standards, physical requirements are rather general, both as found in the survey and in the literature. The handling of loaded trays and the long hours of standing both call for stamina and strength on the part of those engaged in food serving. Other less strenuous jobs place fewer demands upon the physique. Personality factors must not be overlooked in selecting and preparing trainees for positions in which dealing with people is important.

The proportion of colored persons in hotel and restaurant work is not less than the proportion of the race in the general population of Atlantic City. Although most of the jobs currently held by the group are of a menial nature, it is possible that with adequate training, avenues might open to higher positions.

Instruction for chefs, cooks, and bakers might be offered in two ways: (1) basic trade courses in the Technical High School on a regular high school basis; (2) an apprentice training program with related instruction provided by the school.

Even though the number of front office workers is relatively small, training should be provided for this group, inasmuch as the basic skills and knowledge required by the hotels are common to almost any business. The academic high school in Atlantic City currently offers a commercial course which should be adequate.

If the experience requirement could be waived, high school graduates also might be trained in various jobs for whatever length of time needed for mastery.

The New Jersey law prohibiting the employment of minors under 18 in establishments serving alcohol would undoubtedly prevent an instructional program involving work experience for minors under 18. For older trainees a plan might be worked out similar to that described at Miami, Fla. The students served by turns as *guests* and *staff*. The enrollment included waitresses, housemen, bellmen, and front office workers. The courses varied in length from four to ten weeks. Graduates were employed by local hotels. Although Atlantic City does not have a pronounced slack season, it might be feasible to enlist the assistance of the Chamber of Commerce and Hotelmen's Association for a similar laboratory training project.

Recommended Training Program

As an outgrowth of the survey, the following outline is suggested for a training program to be established by the public schools of Atlantic City:

In-school program
- High school trade course
  - Cook
  - Baker
  - Sandwich man
  - Pantry worker
- High school commercial course
  - Cashier
  - Stenographer
  - Clerk
  - Telephone operator

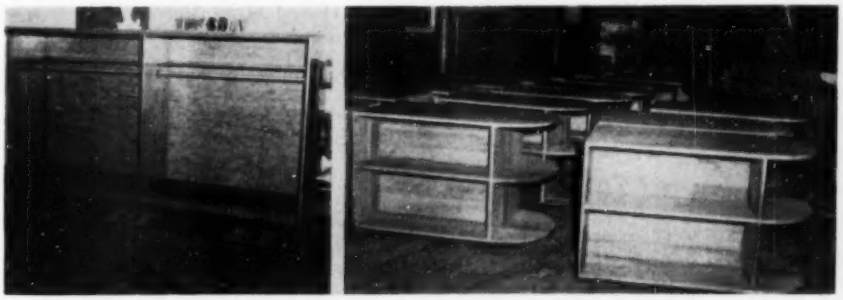
Out-of-school (practical training for beginning workers)
- Waiter and waitress
- Chamber maid
- Bellman
- Front office jobs

Apprentice program
- Chef and cook
- Baker

Trade extension
- Department head
- Manager
- Assistant manager
- Chef and cook (refresher instruction)

Food merchandising

Before such a program can be established, considerable planning and additional research are needed. The close co-operation of local employers and labor groups must be enlisted for the solution of countless administrative details. It is recommended that the school work begin on a modest experimental scale in several selected fields.



Portable hat racks and portable book shelves made by the high school students of Allentown, Pa.

— Photograph, courtesy Lester L. Fehr, director of Vocational and Adult Education

Home Mechanic Illiteracy

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Some time ago I had occasion to visit the office of the manager of an apartment house development. While waiting in the anteroom I was annoyed by the incessant ringing of the telephone. Each phone call was a complaint from a tenant. A clogged drain — a stopped toilet — apartment lights out — cracked windowpane — stove pilot light out — a leaking faucet. The girl at the switchboard was kept busy making out complaint slips for service calls and these slips were picked up by various members of the repair and maintenance crew.

I wondered what the significance of this would be to individuals interested in general education, life-adjustment education, industrial-arts education, the home-mechanics or handy man objective, personal living, etc.

A little later, I asked the manager, Henry Kouwenhoven, if he had any statistics on the number and type of service calls made each year and the frequency of the requests for the repair of home equipment. As his answer was negative, I explained my interest in such a survey for educational purposes and suggested that the results might be helpful to the management in forecasting yearly requisitions for fixtures and parts. Mr. Kouwenhoven agreed to co-operate and for the past two and one-half years various interested groups of graduate students in industrial-arts education have been helping to tabulate periodically the day-by-day breakdown of basic home equipment.

The survey was conducted in an apartment house development named Garden Bay Manor. It is located near LaGuardia Airport on Long Island and is approximately 25 minutes from Manhattan by subway. The development covers 16 acres of beautifully landscaped grounds which include tennis courts, a splendid playground, and a supervised nursery. It was built in 1938. Two thirds of the buildings are two stories high and the remaining third are three stories in height. The apartments consist of three to four and one-half rooms, with tile bathrooms and kitchens furnished with electric refrigerators and gas ranges. Each family has a private basement room which may be used as a playroom, rumpus room, study, or a home workshop. Each group of apartments is centrally heated with steam heat. The unique organization of these apartments simulate in practically every detail the same advantages of individual house tenancy.

Results of the Survey

A total of 14,709 complaint slips were examined and the jobs tabulated according to name, rank, and frequency of occurrence. Many individual job items have not been specifically enumerated but are listed in generalized family groups. For example, faucet repair may entail a number of individual jobs such as tightening the packing nut at a valve stem or replacing a composition disk washer.

Many highly specialized jobs, and such service requests as replacing burned out electric bulbs in hallways, "no hot water" or "no heat" complaints, flooded cellars, and the like, have been counted as miscellaneous (691 total requests) and are not included in the totals.

The management redecorates the apartments on an average of once every three years. Hence painting and floor finishing do not appear in the tabulations.

The results of the survey are as follows:

Rank	*Job*	*Frequency*
1.	Broken windows	1635
2.	Faucet repairs	1443
3.	Clean traps (sinks, tubs, toilets)	1290
4.	Radiator repairs	835
5.	Replace light switches	818
6.	Repair flush tanks	735
7.	Repair or adjust pilot lights on gas stoves	593
8.	Repair window handles (casement)	511
9.	Repair leaks (masonry repairs in walls and ceilings, cracked foundations, brickwork, and plastering)	483
10.	Repair and install window shades	461
11.	Repair doors	449
12.	Repair locks	433
13.	Repair and replace window screens	399
14.	Replace fuses	389
15.	Toilet seats (repair or replace)	386
16.	Pipe leaks	281
17.	Replace lighting fixtures	276
18.	Repair refrigerators	235
19.	Toilet leaks	220
20.	Replace tile in bathrooms	218
21.	Repairs on stoves (parts)	197
22.	Replace keys	181
23.	Repair bells and buzzers	175
24.	Repair electric sockets, outlets, and plugs	161
25.	Corroded water pipes	155
26.	Gas leaks	137
27.	Roof repairs	112
28.	Repair kitchen cabinets and shelves	111
29.	Repair door hardware (knobs, hinges, etc.)	105
30.	Repair clothes dryers	100
31.	General window repairs	93
32.	General carpentry	75
33.	Short circuits	53
34.	Cellar repairs	40
35.	Replace minor bathroom fixtures	37
36.	Floor repairs	33
37.	Repair mailboxes	30
38.	Replace broken light globes	26
39.	Clean and repair leaders and gutters	25
40.	Shower repairs	21
41.	Install new toilet bowls	16
42.	Skylight repairs	13
43.	Weather stripping	13
44.	Broken sewer lines	8
45.	Window wells hooked-up to sewers	7
46.	Thermostats replaced	4
	Total	14,018

Significance of the Study

The results of the survey, especially the great frequency of many *simple* adjust-

ments, repairs, or installations, seem to indicate a lack of knowledge and training concerning the *common practical home mechanical activities* of the men and women that live in this community.

It can be logically argued that a tenant may know how to repair an item, but because he has a repair service available it is easier to "let George do it." It is safe to assume, however, that the 593 people who requested a maintenance man to adjust a gas range pilot light would have found it easier to have twisted a knurled adjustment screw than to have twirled a telephone dial.

It is also safe to assume that the percentage of equipment failure in an apartment house development is comparable to that of individually owned homes. If this assumption is correct, one may wonder how many homeowners know how to adjust or repair items listed in the survey or how to *buy* or *use* them properly.

Simple repair and the maintenance of home equipment are invariably listed among the objectives of industrial-arts education. If the jobs indicated in the survey were checked against existing industrial-arts courses of study, one might find a trenchant need for many additions or revisions — regardless of whether the method of determining the course content was through the *trade analysis technique*, or *to meet individual needs in the basic aspects of life*.

It will be noted that the care of such home appointments as furniture, bedding, rugs, and draperies was not included in the study. Nor were such personal items as clothing, electric irons, percolators, radios and television, pans or dishes. In all probability a knowledge of many other types of repair work is necessary for homeowners to have. This might include a working knowledge of various heating devices, roof repair, garage and automobile maintenance, *ad infinitum*. The results of this survey, however, could form the beginning link of future evidence gathered through other types of research which might evoke a modern program of instruction for efficient home care.

Although this study was limited to a narrow phase of home mechanics, it definitely magnifies once again the need of society for manual literacy — at least in the home. It would seem to focus a need for continued evaluation of the offerings in industrial-arts education based upon *facts* rather than what a teacher or supervisor believes is necessary for pupils in this industrial age.

It is quite probable that the 750 families in this community would agree that modern home competency should certainly receive some consideration by industrial-arts educators in the life-adjustment education offered to the children in the public schools of this country. Perhaps if this were accomplished it might help to keep industrial arts from being classed with the frills and fads of education in the next depression.

Ceramic Equipment, Tools, and Supplies

Vernon D. Seeley, Livingston Manor, N. Y.

AUTOMATIC CONTROLS
- *a*) Electronic temperature controls
- *b*) Time controls

BATS
- Plaster of Paris

BENCH WHIRLERS
- *a*) Aluminum
- *b*) Plastic
- *c*) Setstone bats for whirlers

BOOKS

BRUSHES
- *a*) Camel's hair
- *b*) Squirrel
- *c*) Fine red sable
- *d*) Glaze

CELLOPHANE BAGS FOR STORING GREENWARE

CERAM-INK

CERAMIC DECALS

CERAMIC PENCILS

CHEMICALS
- *a*) Feldspar
- *b*) Flint
- *c*) Gum arabic
- *d*) Kaolin
- *e*) Kiln patching cement
- *f*) Kiln wash
- *g*) Metallic oxides
- *h*) Opax
- *i*) Plaster of Paris
- *j*) Plaster separator
- *k*) Silicate of soda
- *l*) Soda ash
- *m*) White lead
- *n*) Whiting
- *o*) Zircopax

CLAY
- *a*) Red modeling
- *c*) White modeling
- *c*) Fine white flower making clay
- *d*) Porcelain

CONES — Pyrometric, 08-04 standard or junior; 020-018 standard or junior

CROCKS
- *a*) 1-gal. size for glazing with covers
- *b*) 5-gal. size for clay storage with covers
- *c*) 10-gal. size for clay storage with covers

DAMP CABINET — old refrigerator or shop made

FETTLING KNIVES

GLAZES
- *a*) Art
- *b*) Crackle
- *c*) Cold
- *d*) Luster
- *e*) Majolica
- *f*) Matt
- *g*) Overglaze, various colors
- *h*) Platinum
- *i*) Under and overglaze mediums
- *j*) Underglaze, various colors

JARS — Pints and quart for storing glazes

KILN FURNITURE
- *a*) Plate rack
- *b*) Posts
- *c*) Spurs
- *d*) Standard stilts
- *e*) Star stilts
- *f*) Tile setters
- *g*) Triangles

KILNS

KILN SHELVES
- *a*) Full
- *b*) Part

MODELING TOOLS
- *a*) Boxwood
- *b*) Fine-art plaster working
- *c*) Lace tools
- *d*) Moss decorator
- *e*) Plaster
- *f*) Sgraffito
- *g*) Slip tracers
- *h*) Wire loop

PITCHERS
- *a*) Large — slip pouring
- *b*) Small — glaze pouring

PLASTER-OF-PARIS MOLDS
- *a*) Animals
- *b*) Ash trays
- *c*) Book ends
- *d*) Candleholders
- *e*) Candy dishes
- *f*) Cigarette boxes
- *g*) Dishes
- *h*) Figurines
- *i*) Flowerpots
- *j*) Lamp bases
- *k*) Mugs
- *l*) Novelties
- *m*) Planters
- *n*) Salt and pepper shakers
- *o*) Trays
- *p*) Vases

POTTER'S WHEEL
- *a*) Electric — constant speed, variable speed
- *b*) Kick

SCALES

SIEVES OR STRAINERS — 30 mesh, 50 mesh, 80 mesh

SPONGES
- *a*) Cellulose
- *b*) Elephant ear

SPRAY BOOTH
- *a*) Blower
- *b*) Filters
- *c*) Mask for spraying

SPRAY GUNS
- *a*) Electric
- *b*) Hand

TURNING TOOLS
- *a*) Finishing rubbers
- *b*) Rib
- *c*) Right- and left-hand
- *d*) Scrapers
- *e*) Wire

WEDGING BOARD

Single and double pupil desks made by the high school students of Allentown, Pa.

— Photograph, courtesy Lester L. Fehr, director of Vocational and Adult Education

Guides for School-Shop Planning

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School shops are places for planning, experimenting, testing, and developing desirable skills, attitudes, and habits in keeping with our democratic way of life. Consequently, shops should be planned with these purposes in mind.

With educational objectives as the first consideration further planning should be directed toward desirable goals of pupil health and safety and the present and future needs of the school and community. While finances cannot be overlooked in school shop planning, the original plans should be developed without regard to cost. Later, priorities may be established for the various shop features and items of equipment to fit the budget. Thus, items purchased in the future may be installed with a minimum of expense and inconvenience since their location and necessary service requirements (water, power, etc.) have been provided for.

With the foregoing concepts in mind the following principles should be considered when planning a new or remodeled school shop.

Size, Shape, and Location

1. A minimum of 50 square feet per pupil should be provided in shops and 30–35 square feet in drawing rooms. Machine shops, auto shops, print shops, etc., require 60–100 square feet per pupil.
2. Shops should be located on or above grade level.
3. All floor space of a shop should be on one level.
4. Shops should be located where noise will cause the least interference to the rest of the school. A wing of the building or a separate building near the main building should be considered.
5. A rectangular shape (1–2 ratio) is best. Avoid recessed areas, such as *L* and *T* shapes. All parts of the shop should be visible to the instructor. The minimum width should be 24 feet.
6. Open beam ceilings should be avoided.
7. Ceiling height should be at least 12 feet.
8. The shop should not be a passageway to other rooms.

Walls, Floors, and Ceilings

1. Provide wood or tile floors in all areas not subject to extreme heat, oil, or grease. Where these are present, use concrete.
2. Where concrete floors are used and color is desired, the color should be added at the time the floor is poured.
3. Conduit for machines should be laid before the floor is poured and allowed to extend 6 to 9 in. above the floor. Conduit outlets in the floor along the walls should be 6 to 9 in. from the wall to facilitate cleaning.
4. Walls should have a smooth finish. A wainscoting 40 to 48 in. high and of a durable nature should be provided.
5. Provide transparent partitions between shop and auxiliary rooms.
6. Ceilings should be acoustically treated.

Windows and Doors

1. Window area should be 20 to 25 per cent of the floor area.
2. Use steel sash of the awning or deflector type when possible.
3. Windows should extend to the ceiling.
4. Select a northern exposure when possible. Drawing rooms should have a northeast exposure.
5. Sunlight should be controlled before entering the shop in warm climates and after entering the shop in cooler climates.
6. Provide only one door as the regular means of pupil entrance.
7. One large entrance on a service drive should be provided.
8. All shop doors should open out.
9. Door locks should be master-keyed.

Illumination and Painting

1. A minimum of 30 foot-candles at bench height should be provided in shops and a minimum of 50 foot-candles in drawing rooms. Local lighting should be provided where necessary.
2. Direct or semidirect types of fixtures are best for shops. Diffused light is preferred. Incandescent light is generally satisfactory. Fixture height should be at least 10 feet in shops.
3. Light switches should be located near the main entrance to the shop or drawing room.
4. The lighting circuit should be separate from circuits for machines and wall convenience outlets.
5. Secure the advice of a lighting expert when possible.
6. Ceilings and walls should be painted with a flat, high reflection factor paint. Ceilings should be white with a reflection factor of 85 per cent or above. Upper walls should be of suitable color and with a reflection factor of 60 per cent. Wainscoting should have a reflection factor of 40 to 60 per cent. Equipment in the shop should be painted to carry out the dynamic color scheme.

Equipment

1. Plan the shop to reduce disciplinary problems.
2. Arrange equipment for maximum safety.
3. The teacher's desk should be near the entrance.

(Continued on page 26A)

there's a *Hamilton*
student table
to meet every requirement

Whether you're buying a single table or completely equipping a new department, you can depend on Hamilton equipment—designed, built and priced with school budgets and student use in mind.

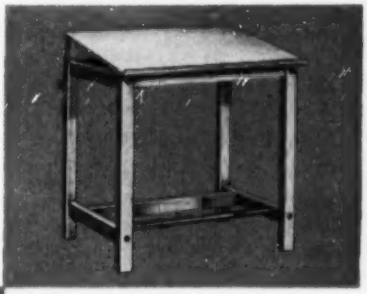
From the sturdy, good-looking 3-unit Student Drafting Table Assembly to the simplest drawing table, you'll be impressed with the traditional quality and budget economy that has made Hamilton the industry pacesetter. See your local Hamilton dealer, or use the coupon below for a complete description of efficient work-designed Hamilton student tables.

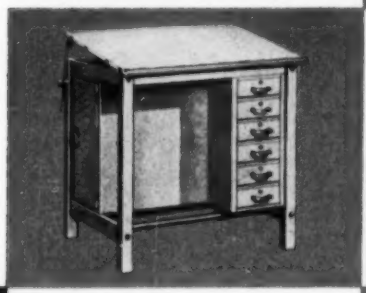
Hamilton
MANUFACTURING COMPANY
Two Rivers, Wisconsin

Table V-1620

Length: 38½" Width: 28½" Height: 40"

A basic student table built of Northern Wisconsin Birch. Adjustable top is securely positioned with two handwheels and adjustable rods. Stationary paper ledge at front. Iron pipe footrest. Base unit for Drafting Table Assembly.





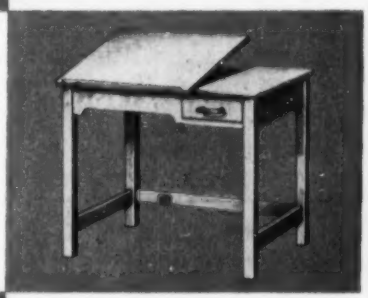
Student Drafting Table Assembly

Space-saving economy is available when tool drawer unit V-1621 and board storage unit V-1623 are added to table V-1620. Storage unit arrangement can be reversed for right or left aisle.

Table V-1703

Length: 36" Width: 24" Height: 30"

26" x 24" tilting top is adjustable. No protruding levers. Drawer 14½" x 9" x 2⅛". Stationary top 10" x 24". Adjustable paper ledge. Steel gliders on legs. Northern Wisconsin Birch construction.



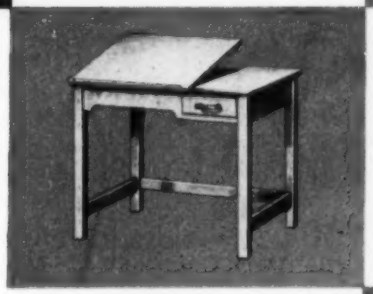


Table V-1704

Length: 34" Width: 20" Height: 30"

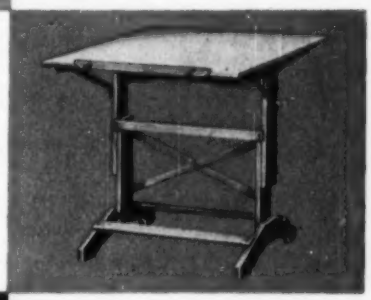
24" x 20" adjustable top. No protruding levers. Drawer 14½" x 9" x 2⅛". Stationary top 10" x 20". Adjustable paper ledge. Northern Wisconsin Birch. Smaller version of V-1703.

Table 439

Length: 36" Width: 24"

Height: 30½" - 40¼"

Built of selected hardwoods. Unfinished top is sanded smooth clear-grain soft basswood reinforced with hardwood cleats. Adjustable slope and height is held rigidly by two handwheels.



Hamilton Manufacturing Company
Two Rivers, Wisconsin

Please send me further information and prices of Hamilton Student Tables

Name_____

Institution_____

Address_____

City_____ State_____

GUIDES FOR SCHOOL-SHOP PLANNING

(Continued from page 114)

4. Provide aisles of travel to commonly used areas. Allow ample space around equipment.

5. Locate equipment used in sequential order in the order of their operation.

6. Locate related areas together, i.e., welding, forging, foundry; ceramics, Keene's cement, plastics; etc.

7. Utilize naturally lighted areas to the maximum and consider direction of light in locating equipment.

8. Purchase only self-contained machines and not combination machines. Never run two or more machines from the same motor.

9. Locate machines to accommodate largest sizes of materials commonly handled, but do not distort the most effective arrangement for the occasional extra large piece.

10. Locate the most frequently used equipment near the center of operation.

11. Allow sufficient floor space for assembly areas.

12. Bolt machines to the floor. Mount light machines on celotex and heavy machines on sheet lead.

13. Do not mount machines on columns, piers, or pipes that will transmit sound to other parts of the building.

14. Where necessary provide dust collectors for machines and exhausts for gases and fumes.

15. All wiring should be installed according to the electrical codes.

16. All machines should be controlled by a master switch accessible to the instructor only.

17. All machines should have a good electrical ground.

18. All switches on machines should be conveniently located.

19. Flexible conduit should be used to connect machines to conduit or box.

20. Paint safety zones around dangerous equipment.

21. Provide guards for all equipment where necessary.

22. Locate tool panels in or near the area in which they are used.

23. Tools and equipment should be purchased with the sizes of the pupils in mind.

24. Purchase high quality equipment only.

25. Planning and reference centers should be located in the cleanest area of the shop.

26. Lighted display cabinets or cases should be provided, both inside and outside of the shop.

27. Lumber and metal bar stock, band iron, etc., may be stored in vertical bins to conserve space.

28. Tool panels displaying the tools used in an area and with silhouettes and color coded tools are effective.

Other Considerations

1. Provide adequate storage space for pupil projects, supplies, etc.

2. Provide sinks with hot and cold running water where necessary.

3. Washing facilities should be provided in the shop. If possible toilet facilities should also be provided as well as drinking facilities.

4. Provide adequate chalkboard and bulletin board space.

5. Provide the correct type of fire extinguisher in the various areas.

6. Provide steel safety cans for wastes, flammable liquids, etc.

7. Locate a fully equipped first aid cabinet near the instructor's desk.

8. Maintain control of consumable supplies by keeping them locked in adequate storage facilities.

9. Water, gas, electricity (*220 V* — 3 phase, *220 V*-single phase and 110 *V*) and compressed air should be provided.

10. Locate convenience outlets in the walls of the shop where necessary. Outlets should be at least 36 in. above the floor. Outlets for soldering irons and other heating equipment should be equipped with pilot lights.

11. Unit type heaters mounted near the ceiling are generally suitable. In shops where pupils work on the floor, as in auto mechanics, floor radiant heating should be considered.

12. Ventilation systems for shops should be separate from the ventilation system for the rest of the school.

13. A unit of the school fire alarm system should be installed in the shop as noises prevent its being heard when outside the shop.

The average iron lung patient spends 16 hours a day in his respirator and the cost to the March of Dimes averages $18 per day per patient. — *Public Relations Department, National Foundation for Infantile Paralysis.*

INDUSTRIAL ARTS FOR ADULTS

M. L. SCHMITT
Associate Professor
Industrial Arts Education
N. C. State College
Raleigh, N. C.
and
JOHN ERICKSON
Associate Professor
Industrial Arts Education
Ga. Teachers College
Collegeboro, Ga.

One way in which an industrial-arts teacher can make a contribution to his community is by offering an adult program for the townspeople.

He not only can aid individuals in the field of adult education, but in so doing, can strengthen the industrial-arts department in the school through his contacts with parents, clergy, business people, and others, who attend the adult classes.

This short article is to provide an outline for a school to follow if it is interested in developing an adult program for the community, not only for industrial arts but for other adult activities as well.

General Outline for Setting Up an Adult Education Program

I. Survey local community to determine desires and needs for such a program.
   A. Steering and advisory committee formed
      1. Inventory of community
      2. Inventory of other community programs

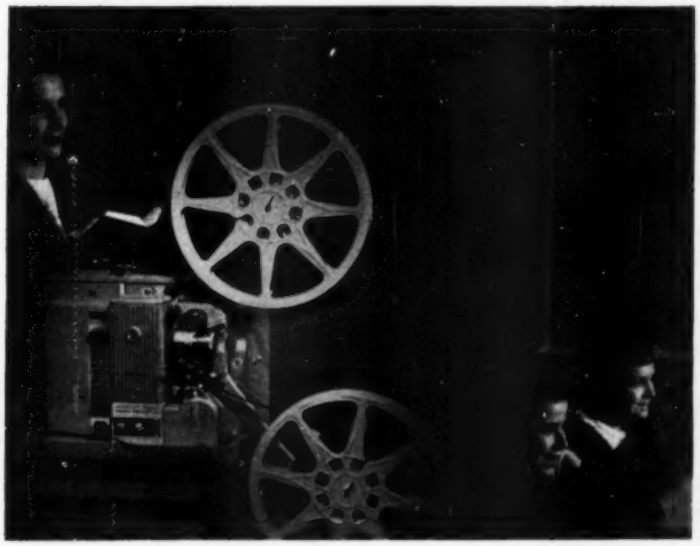
II. As a result of the survey, determine probable program to be offered.
   A. Interested individuals have already indicated the type of program they desire.

III. Check availability of funds and fees necessary.
   A. State and federal funds (if any)
   B. Donations and other sources
   C. Laboratory fees
   D. Registration fees

IV. Outline of proposed program to be presented for recommendations and approval by department head and administration.
   A. Types of courses to be offered
   B. Instructor personnel needed and

(Continued on page 28A)

Who'd ever guess that oil could be the enemy of sound projector performance?



Kodascope *Pageant* Sound Projector

Lists at only **$400,** including speaker for classrooms and small auditoriums

For that's exactly what has been proved in thousands of churches and schools using sound projectors. Sometimes *too little oil* has been the trouble. Equally as often, *too much oil.* One causes wear and breakdown. The other gums up parts, stalls motors, smears valuable films.

Kodak engineers determined to dispel this problem before introducing their sensational sound-and-silent 16mm. Kodascope Pageant Sound Projector. "We'll eliminate the oilcan altogether by permanently prelubricating our machines at the factory." And, through the use of oil-impregnated bearings, sealed-in-oil bearings, "lifetime" oil-retaining pads, low-friction nylon gears, and a minimum of moving parts—that's exactly what they did!

Four more leading Audio-Visual Dealers give their opinions about the Pageant below. Ask *your* Kodak Audio-Visual Dealer to demonstrate this fine projector. (Or mail the coupon.) Then you will quickly understand why on over-all performance—simple operation—brilliant screening—natural sound—*and freedom from service trouble*—the Kodascope Pageant Sound Projector stands alone.

"... Everybody and nobody oils institutional projectors. RESULT: Complete breakdown or faulty operation. Stated in schoolman's terms: when P means projector and O means oil, P minus O equals TROUBLE ... and P plus O^2 equals TROUBLE. The Kodascope Pageant Sound Projector, by permanent factory lubrication, has eliminated this problem!"

Donald C. Hallenbeck
Hallenbeck & Riley, Albany, New York

"... Not many people realize that oiling a projector too much is as bad as oiling it too little. The majority of our shop's repairs are caused by improper oiling. Yet we've *never* had to service a Kodascope Pageant Projector because of lubrication difficulties!"

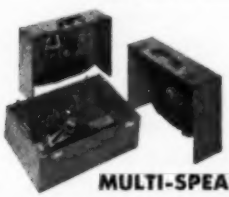
W. J. Schap
Artz Studio & Camera Shop, Aberdeen, South Dakota

"... We dubbed him 'Oil-Can Dan.' He had charge of a number of projectors we sold to this institution. No matter how many times we warned him on overoiling, the machines made regular trips to our repair shop. We're going all out for the Pageant and its permanent prelubrication feature. We're sure we'll eliminate over 75% of our complaints ..."

Robert S. Franzoni, *President*
Wilson Sports Equipment Co., Inc.
Rutland, Vermont

"... There are a lot of fine features in the Pageant. But I can't think of any one that is more important from the standpoint of customer satisfaction than permanent lubrication. It keeps Pageants in use where they will do the most good—especially important to schoolmen who operate on busy schedules these days ..."

J. Austin Corcoran
Claus Gelette, Inc., Cambridge, Mass.



MULTI-SPEAKER UNIT
Lists at only **$92.50**
3 extra speakers in matching case for auditorium use.

MOTION PICTURES
... teach, train, entertain

Prices subject to change without notice

Send This Coupon Today ...

EASTMAN KODAK COMPANY, Rochester 4, N. Y. 193

☐ *Send me name of nearest Kodak Audio-Visual Dealer.*
☐ *Complete information on the 16mm. Kodascope Pageant Sound Projector.*

NAME_____

ORGANIZATION_____

ADDRESS_____

CITY_____ (Zone) STATE_____

Kodak

INDUSTRIAL ARTS FOR ADULTS

(Continued from page 26A)

approximate pay ($3 per hour, minimum)

C. Scheduling
   1. Suggested number of nights per week — one or two
   2. Suggested time of class — 7:00 to 10:00 p.m.
   3. Suggested length of course — 15 meetings
   4. Probable registration fees — $2
      a) To be returned when 75 per cent of meetings have been attended
   5. Methods of handling fees and funds
      a) Material purchase card or other similar device

D. School policies and regulations affecting this program
   1. Vary with each individual school

V. Publicity of program and offerings.
   A. Suggested promotion methods
      1. School paper
      2. Local paper
      3. Leaflets
      4. Posters
      5. Radio
      6. Exhibits and programs
   B. After program begins, publicity will still be continued with frequent reports on progress and new offerings
   C. Systematic coverage of population
      1. Mailing lists
      2. Directories
      3. Personal letters to selected groups
      4. Hand distribution of publicity material
   D. Personal approaches
      1. Meeting and affiliations with organizations
      2. Person-to-person methods

VI. Proposed activities based on available facilities (industrial arts)
   A. Minimum list below
      1. Architectural drawing and home planning
      2. Cabinetmaking
      3. Upholstery
      4. Finishing and painting
      5. Refinishing furniture
      6. Wood turning
      7. Machine shop
      8. Welding
      9. Art metal work
      10. Care and repair of household appliances
      11. Leathercraft
      12. Plastics
      13. Photography
      14. Home mechanics

VII. Enrollment
   A. Class size
      1. Maximum of 15 per teacher
      2. Teacher and student assistant recommended
   B. Preference given to first come, first served
   C. Registration of interested individuals
   D. Collection of fees

VIII. Teaching staff
   A. An industrial-arts teacher, when properly trained, can carry on many of the offerings listed under the proposed activities.
   B. Junior or senior industrial-arts majors used as assistants

(Continued on page 31A)

ARMSTRONG
Quality TOOLS
ARMSTRONG TOOL HOLDERS
Permanent, multi-purpose tools, for every operation on Lathes, Planers, Slotters and Shapers.
ARMSTRONG HIGH SPEED
Ready-to-grind Bits Ready-ground Cutters
ARMALOY Cast Alloy CUTTER-BITS
ARMIDE Carbide-Tipped CUTTERS
6 cutter shapes, 12 sizes—2 grades of hardness.
ARMSTRONG BORING TOOLS
6 types with boring bars in 16 sizes for all boring and internal threading work. Hold cutters at 90°, 45° and 30°
ARMSTRONG THREADING TOOLS
have high speed steel form cutters, require only top grinding to resharpen. Hold true thread form. Rigid and "Spring" types.
ARMSTRONG Drop Forged DOGS
Lathe Dogs, Milling Machine Dogs, and Clamp Dogs. 12 types, all sizes.
ARMSTRONG Drop Forged "C" CLAMPS
Heavy Duty, Medium Service, Deep Throat, and Tool Makers' types in all sizes. Also drop forged Machinists' Clamps.
ARMSTRONG Setting Up Tools
A complete line of Drop Forged Strap Clamps, Planer and Bracing Jacks and T-slot Bolts.
ARMSTRONG Drop Forged Eye Bolts
Plain or shoulder pattern. Blank or Threaded. 14 sizes. Drop Forged and heat treated.
ARMSTRONG Ratchet Drills
All steel wearing parts hardened. Packer, Railroad, Standard, and Short types, both plain and reversible.
ARMSTRONG Drop Forged Wrenches
Both Carbon and Alloy Steel. Over 100 types in all sizes. Improved designs, steels, and heat treating give greater strength.
ARMSTRONG Detachable Socket Wrenches
All sizes and types with driving handles, extensions, and drop forged ratchets. Sold singly or in cased sets.
ARMSTRONG Machine Shop Specialties
Drill Drifts, Tool Posts, Drill Holders, Cutter Grinding Holders, and Tool Makers' Vises.
ARMSTRONG BROS.
Better Pipe Tools. A complete line, each a better tool with hardened, alloy or drop forged parts wherever they will add to strength or tool life.
ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5222 W. ARMSTRONG AVENUE
CHICAGO 30, ILL.

CONTROLLED TEMPERATURE EQUIPMENT

FOR LONG SATISFACTORY SERVICE

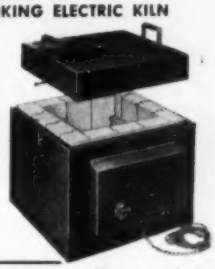
Hotpack TRADE MARK

SEND FOR CATALOG

Hotpack KILN KIT

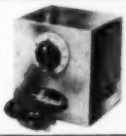
EVERYTHING YOU NEED TO MAKE THIS PROFESSIONAL LOOKING ELECTRIC KILN

LARGE CHAMBER:
12" deep, 11" wide, 9" high



YOU GET: Illustrated instruction Manual, Insulating Back Up Material, Insulated Cover & Handle, Wire — Screws — Terminal Board, Insulating Brick — cut to size, Sheet metal case — Welded & Painted, Hotpack Heating Elements, wired 15 Amps — 115 volts — Ready to install.

Prices including Freight and Crating:
East of Denver — $48.00
West of Denver — $55.00



YOU NEVER FORGET to turn off your kiln with the

HOTPACK LIMITOR

Plug-in Type, 115 v. — $14.95
Wire-in Type, 220 v. — $27.95

Hotpack ELECTRIC CERAMIC KILNS

Designed for Use in Art Courses in the School

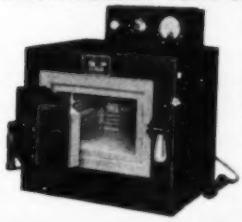
1. Eye level controls — pilot light.
2. Built-in pyrometer for visible accurate temperature indication.
3. Handles are cool to touch.
4. Control switch — low, medium, and high heat for even distribution.
5. Special insulation holds heat and prevents scorching of table top.
6. Maximum temperature 2050° F.

SPECIFICATIONS

Model No.	Interior Size	Shelves Furnished	Approx. Time	Characteristics Electrical	Price F.O.B. Phila.
7006	8"x 8"x 5½"	1	3 hrs.	115 V-15 Amp.-1700W	$ 65.00
7004	8"x 8"x11"	2	4 hrs.	115 V-15 Amp.-1700W	$ 95.00
7005	12"x12"x11"	2	3 hrs.	220 V-23 Amp.-5000W	$205.00
7007	15"x15"x16½"	3	4 hrs.	220 V-30 Amp.-6600W	$410.00
7009	12"x12"x 5½"	1	4 hrs.	115 V-15 Amp.-1700W	$105.00

Enameling on copper can be efficiently fired on our models No. 7006 and 7009 due to the fact that they are designed with removable shelves and also the firebrick insulation with permit thermal shock at normal enameling temperatures.

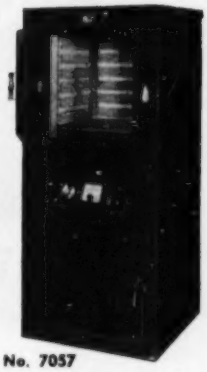
CONTROLLED TEMPERATURE KILNS FOR ENAMELING ON COPPER



These units provide manual adjustment of temperature for kilns. They may be regulated so that current may be supplied to the kiln for any percentage of time per minute. This method of selection provides exact temperatures because the slightest movement of the control knob will vary the time of input, thereby raising or lowering the temperature as desired.

Model	Interior Size	Price F.O.B. Phila.
7069	12"x12"x5½"	$140.00
7066	8"x 8"x5½"	100.00

Hotpack ELECTRIC HEAT TREATING FURNACE



No. 7057

For hardening, drawing, tempering, and annealing or normalizing of dies, punches, gages, fixtures or other parts are performed readily with these redesigned Hotpack Electric Box Furnaces.

This new Hotpack Electric Furnace is fast heating — built for continuous use from 300° F. to 2000° F. It is the only furnace equipped with Automatic Controlling-Indicating Pyrometer and also with Limitstat control in this price field.

SPECIFICATIONS

Model	Interior Size W. D. H.	Current Characteristics	Shipping Weight	Price F.O.B. Phila.
7076	8"x 8"x 5½"	110 V-AC-15 Amp.	180 lbs.	$195.00
7074	8"x 8"x11"	115 V-AC 15 Amp.	200 lbs.	$225.00
7075	12"x12"x11"	220 V-AC-23 Amp.	350 lbs.	$350.00
7077	15"x15"x16½"	200 V-AC-30 Amp.	550 lbs.	$550.00
7079	12"x12"x 5½"	110 V-AC-15 Amp.	250 lbs.	$235.00

THE Hotpack ELECTRIC PLASTIHEETER

Designed for Use in Plastic Courses in the School

The HOTPACK PLASTIHEETER is a commercial type strip heater designed to heat sheets of Plexiglass or Lucite until they become soft and pliable for shaping to the form desired. It is essentially used for straight line bends or folds and is capable of heating sheet material up to ⅛" thickness in from 30 seconds to 4 minutes depending on the thickness of the material. As the material does not come into contact with the heating element and the platen remains cool, there is no possibility of creating mark-off on the sheet.

No. 15

SPECIFICATIONS

Model No.	Working Space	Overall Size	Wattage 115 Volt	Shipping Weight	Price F.O.B. Phila.
15	18"Lx5"Wx2½"H	21"Lx7"Wx3½"H	200 W	4 lbs.	$15.00
16	30"Lx5"Wx2½"H	32"Lx7"Wx3½"H	350 W	6 lbs.	$25.00

No. 600

Hotpack PLASTIC PRE-HEATING EQUIPMENT

ELECTRIC PORTABLE OVEN

For preheating Methyl Methacrylate in sheet or rod form where it is necessary to maintain even temperature throughout the sheet, especially desirable in compressed air, vacuum or pressure forming techniques.

The Oven is controlled by a newly developed thermostatic control, sealed in and conveniently placed on the front panel, of the Oven. It can accurately be set at any desired temperature where a quick rate of heat up to 306° F. is desired.

Due to the Aluminum Construction, the Oven is very light in weight and can be carried from room or project to project. As it operates on 110 volt AC or DC, it can be plugged into any 110 volt receptacle.

SPECIFICATIONS

Model	Interior Size	Exterior Size	Wattage 110V AC-DC	Shipping Weight	F.O.B. Phila. Price
600	12"Wx12"Dx12"H	16"Wx19"Dx24"H	700	60 lbs.	$ 75.00
602	24"Wx12"Dx12"H	28"Wx19"Dx24"H	1400	110 lbs.	$125.00

SEE OUR EXHIBIT . . . at the Convention of the American Industrial Arts Association at the Statler Hotel, Dertoit, Mich.
April 29 to May 2, 1953

THE ELECTRIC Hotpack COMPANY, INC.

5067 COTTMAN AVENUE • PHILADELPHIA 35, PA.

STEEL BARGAINS!

for School Shops . . .

The SUPER TINKER-PAK 15 lbs. $4.95

Finest quality assortment of carbon and alloy steel Bars from 3/16" to 1/2", Flats from 1/8" x 3/16" to 1/4" x 1/2", Seamless tubing from 1/4" to 1 5/8" O. D. Contains 12 pieces each approximately 36" long. Students can make or repair thousands of items!

SURE SPEC Flat Steel Assortment 100 lbs. $9.50

This high quality Sure Spec flat steel package contains Hot Rolled, Cold Rolled and Coated rectangular pieces of 100 sq. inches and larger, from 1/16" in thickness and lighter. This is the only utility flat steel pack for school shops on the market!

Immediate delivery. Satisfaction is Guaranteed. Terms 2%, 10 days, 30 days net, F. O. B. Cleveland, Ohio. Send your orders to

SOLAR STEEL CORPORATION

General Offices
Union Commerce Bldg.
Cleveland, Ohio

"for service dependable as the sun"

INDUSTRIAL ARTS FOR ADULTS

(Continued from page 28A)

C. Preparation of procedure guide for teachers may include:
1. Handling of supplies
2. Maintenance equipment
3. Storage of unfinished projects
4. Refunds
5. Building rules
6. Records and reports
7. Certificates for completion of course, if desired
8. Safety instruction

D. Nonschool instructors
1. Former teachers living in community
2. Community leaders
3. Men from industry

COURSE OUTLINE FOR SERVICE STATION ATTENDANTS

ERNST H. SUERKEN

ERNST H. SUERKEN
Supervising Principal
Union Free School District, Greenburgh
No. Eleven
Dobbs Ferry, N. Y.

This material has been developed as an introduction to auto mechanics and to qualify boys for service station attendants if they do not have the aptitudes and innate mechanical ability to pursue auto mechanics to a successful conclusion.

The things learned in performing these tasks should make it possible for a boy to decide if there is any phase of the automobile industry which he would choose vocationally. The material should also bring about the more intelligent use of an automobile. It is believed that the student who follows the outlined plan of work diligently will be able to operate an automobile both safely and economically.

There is a growing need to be well informed about an automobile. This need has been brought about by the tremendous increase of motor vehicles being operated on our highways making it necessary for automobile drivers to be adequately prepared to meet new traffic problems. A knowledge of what constitutes good tires, good brakes, and good steering should make it possible to obey the rules of the road more intelligently. It is hoped that the material will be found stimulating both for those students whose interest is in the service station area and for those who qualify to pursue auto mechanics vocationally and helpful to the instructor.

Basic Course Outline for Service Station Attendant

This outline has been designed to meet the basic needs in training a service station attendant.

INTRODUCTION:

A. Personal appearance
a) Clothes
b) Uniform
c) Personal cleanliness

B. Attitude
a) Qualities to be cultivated
b) Use of personality

C. Knowledge your greatest asset
a) Familiarity with salient servicing points
b) Familiarity with measurements and capacities

The following material indicates in two sections the basic jobs needed to train a

(Continued on page 34A)

SHELDON
CHICAGO U. S. A.

These 3 quality machine tools are especially adapted to school use because of their:

AMPLE SIZE – permits wide range of practical projects.

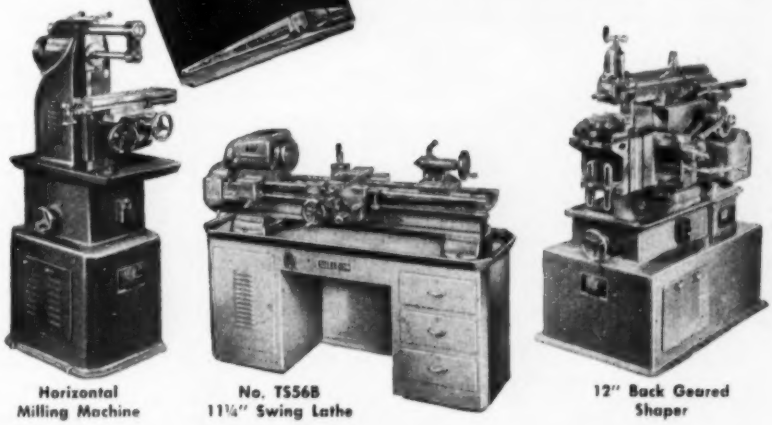
STANDARD DESIGN – true industrial tools with standard controls.

PERMANENT ACCURACY – these tools hold their accuracy under student abuse, do not require constant rebuilding and servicing.

SAFETY – all drives completely enclosed; all speed changes made by external levers.

PRICE – these are moderate priced tools that school shops can afford.

Write for the SHELDON Catalog showing and describing (with complete specifications) the line of: SHELDON Precision Lathes (9", 10", 11", and 13" Swing), Sheldon Milling Machines, Sheldon Shapers and Sheldon Machine Tool accessories and attachments.



Horizontal Milling Machine
No. TS56B 11¼" Swing Lathe
12" Back Geared Shaper

SHELDON MACHINE CO. Inc.
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
4244 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

Electrical-Shop Equipment, Supplies, and Motor Testing Equipment

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

BENCH GRINDER
BENCHES — plain or with drawers, for tools and equipment, or with compartments for the storing of wiring panels. Preferably they should have electrical outlets
BITS
- *a*) Auger, ¼ in. to 1 in. by 16ths
- *b*) Auger, $1\frac{1}{16}$ in., 18 in. long
- *c*) Drill, for wood, square shank, ⅛ in. to ½ in. by 16ths
- *d*) Expansion
- *e*) Extension, 18 in.
- *f*) Screw driver, ¼ in.

BLACKBOARD — permanent or portable
BLOWTORCHES — 1-qt. size
BOOKCASE
BRACES — ratchet type, 8-in. swing
BULLETIN BOARD
CABINETS — wood or metal for filing class records, instruction sheets, drawings, etc.
CHAIRS — teacher's and tablet arm
COMPASS SAW
COIL
- *a*) Spreader
- *b*) Taper
- *c*) Winder

DESK — teacher's, with drawer compartments
DRILL
- *a*) Breast
- *b*) Concrete, ⅜ in., ½ in., ¾ in., 1 in.
- *c*) Hand
- *d*) Portable, electric
- *e*) Twist, 1/32 in. to ⅜ in. by 32nds

DRILL PRESS
- *a*) Bench, hand, or power driven
- *b*) Heavy, power driven

FILES
FIRST-AID CABINET AND SUPPLIES
HACK SAW
- *a*) Blades, 10 in., 24 tooth
- *b*) Frames adjustable

HAMMERS
- *a*) Claw, 12 oz.
- *b*) Machinist's, ball peen

HICKEY — ½ in. and ¾ in.
LATHE
- *a*) Engine, 10-in. or 12-in. swing, 6 ft. or 8 ft. long
- *b*) Speed

PLIERS
- *a*) Gas, 6½ in. and 8 in.
- *b*) Side cutting, 6 in.

PUNCH — for metal molding
PUNCHES — assorted
REAMERS
- *a*) Pipe burring, ¼ in. to 1 in.
- *b*) Pipe burring, ½ in. to 2 in.

RULES
- *a*) 48 in. zigzag
- *b*) 72 in. zigzag

SCREW DRIVERS — 3 in., 5 in., and 8 in.
SHEARS — for cutting metal molding
SOLDER DIPPERS
SOLDERING COPPERS
- *a*) Assorted
- *b*) Electric
- *c*) Handles

STOCKS AND DIES — for Pipe threads, ½ in. to 1 in.
VISES
- *a*) Machinist's, 4 in.
- *b*) Pipe

WRENCHES
- *a*) Adjustable, 6 in. and 8 in.
- *b*) Pipe, 10 in., 12 in., and 14 in.
- *c*) Socket, combination

Electrical Shop — Supplies

ABRASIVE CLOTH — Aluminum oxide, 1, 1½, and 2 in. wide
ARMORED CABLE
- *a*) 2 wire, No. 14, single strip
- *b*) 3 wire, No. 14, single strip
- *c*) Box connectors

ATTACHMENT PLUG
BAR HANGERS
BATTERIES — dry cells
BATTERY ACID — 1.300
BATTERY SEALING COMPOUND
BOX CLEATS
BRADS — ¾ in., No. 19, and 1½ in., No. 16
BRAKE LINING — ¼ by 2 in.
BRUSHES — Carbon, for motors and generators
BURGLAR CONTACTS
- *a*) Open circuit
- *b*) Closed circuit

BUSHINGS
- *a*) Loom, No. 1 and No. 2
- *b*) "Jiffy" loom No. 2

BUZZERS
CLEATS — unglazed porcelain, 2 wire
CLIPS — test, with insulators, Universal, Nos. 22, 23, 24, and 25
COMMUTATOR CEMENT
CONDUIT
- *a*) Bushings, ½ in., ¾ in., and 1 in.
- *b*) Box connectors, for flexible
- *c*) Couplings, for flexible
- *d*) Lock nuts, ½ in., ¾ in., and 1 in.
- *e*) Rigid, ½ in., ¾ in., and 1 in.

CONDULET
- *a*) Fillings, ½ in., LL, LR, and LB
- *b*) Covers, ½ in., blank

DOOR OPENERS — mortised
FISH PAPER — .0125 in. thick
FIXTURES — brass chain, suspension
FIXTURE STUDS
FUSES
- *a*) Plug type, renewable, 125 volt, 15 amp.
- *b*) Cartridge type, renewable, 125 volt, 30 amp.
- *c*) Renewals for plug fuses
- *d*) Renewals for cartridge fuses

GROUND CLAMPS — ⅜ in. to 1 in., assorted
HICKEY GRIPS — ½ in. and ¾ in.
LAMPS
- *a*) Carbon, 220 volt, 60 watt
- *b*) Mazda, selected as wattages and voltages
- *c*) Guards for brass sockets

LEATHER NAIL HEADS
LUGS — 25 and 50 amp.
LUMBER — 2 by 4 in. by 14 ft., No. 1, white pine dressed, 4 sides
MOLDING
- *a*) Metal
- *b*) Metal, fittings — crosses, T's, internal elbows, junction boxes, switch bases, keyless receptacles, snap switches

NAILS — roofing
NUTS — iron, 4–36, 6–32, 8–32, 10–24, 12–24, 10–32, 14–20
OUTLET BOXES — 4 in. square, with one round blank cover, and one cover with bushed opening
PIPE STRAPS — galvanized, ⅜ in., ½ in., ¾ in., and 1 in.
PUSH BUTTONS
- *a*) Return call, 3 point
- *b*) Single

RECEPTACLES
- *a*) Flush, duplex
- *b*) Porcelain cleat, 660 watt, 250 volt
- *c*) Concealed
- *d*) Covers

RECTIFIERS — Tungar, for charging from 1 to 12, 6- and 12-volt batteries
RELAYS — Dixie
RESISTANCE BOARDS — for testing
RESISTANCE UNITS — 125-ohm
RHEOSTATS
- *a*) Compression, 275 watt
- *b*) Field, for shunt and compound motors

ROSETTES — wood
ROTARY CONVERTER — 5-kw. capacity, 3 phase a.c., 110 volt d.c.
SCREWS
- *a*) Anchors, 8/32, 10/24, 12/24, 14/20
- *b*) Machine, roundhead, 4–40 by ¼ in., 6–32 by ½ in., 6–32 by ¾ in., 8–32 by ⅜ in., 8–32 by ½ in., 8–32 by 1 in., 10–32 by ⅜ in., 10–24 by ⅜ in., 10–24 by ¾ in., 10–32 by ¾ in., 12–24 by 1 in.
- *c*) Machine, brass, roundhead, 4–40 by ¼ in., 6–32 by ½ in., 6–32 by ¼ in., 8–32 by ¼ in.
- *d*) Wood, flathead bright, No. 5 by ¾ in., No. 8 by ½ in., No. 8 by ¾ in., No. 8 by 1 in., No. 7 by 1½ in., No. 8 by 1½ in., No. 7 by 2 in.
- *e*) Wood, roundhead blued, No. 7 by 1 in., No. 8 by 1½ in., No. 10 by 1½ in., No. 7 by 2 in.

SLEEVING — No. 1, white; No. 1, blue; and No. 1, red
SOCKETS
- *a*) Brushed, brass pull chain, keyless, key
- *b*) Porcelain, keyless, with caps
- *c*) Porcelain, key, with caps

SOCKET CAPS — ¼ in. and ⅜ in. bushed
SOLDER WIRE — 50/50, size No. 10
SOLDERING PASTE — 2 oz. cans, noncorrosive
SOLDERING SALTS — 1-oz. cans, noncorrosive
SPEED COUNTERS — 0–9999
SPLIT KNOBS — porcelain
SPRING BALANCES — 0–30 lb.
STARTING BOXES
- *a*) For compound motors, various makes
- *b*) For shunt wound, 1 h.p., 110-volt motors. Overload release
- *c*) For shunt wound, 1 h.p., 110-volt motors. No voltage release
- *d*) Starting devices of various makes and principles, for 1 h.p., 3-phase, 220-volt a.c. motors

STORAGE BATTERIES — 6 volt
SWITCH
- *a*) Battery, 4 point
- *b*) Bases, porcelain, for 10-amp. switches
- *c*) Boxes, 2¾ in. deep
- *d*) Entrance, safety, 2 pole, 30 amp., with 2-branch lighting circuits
- *e*) Entrance, safety, 3 pole, 30 amp., 250 volt
- *f*) Flush, push button, S.P., D.P., 3 way, 4 way
- *g*) Surface, S1, S3, and S4
- *h*) Knife, type A, D.P.S.T., D.P.D.T., S.P.S.T., and S.P.D.T.
- *j*) Surface, snap, electrolier
- *k*) Surface, snap, S.P.D.P., 3 way, 4 way

SWITCHBOARD — as required
TACKS — double-pointed No. 10
TAPE
- *a*) Friction, ½-lb. rolls
- *b*) Rubber, ½-lb. rolls

TELEGRAPH SETS — including sounders, keys, and relays
TELEPHONES
- *a*) Complete bridging, independent phones
- *b*) Couch vestibule telephones
- *c*) Receivers, transmitters, induction coils, condensers, and bridging switch hooks

TRANSFORMERS
- *a*) Bell ringing, 6, 8, 14 volt
- *b*) Single phase, 110–220 volt, S.K.V.A.

TUBES — porcelain, 5/16 by 3 in., 5/16 by 5 in., and 5/16 by 10 in.
TUBING — flexible nonmetallic, ¼ in. and ⅜ in.
WASHERS
- *a*) Iron, ¼ in. and ⅜ in.
- *b*) Brass, ¼ in. and ⅜ in.

WIRE
- *a*) Annunciator No. 18 or No. 20
- *b*) Fixture, No. 18, single yellow, with marker
- *c*) Rubber covered, solid copper, No. 10, black
- *d*) No. 10, white
- *e*) No. 14, black
- *f*) No. 14, white
- *g*) Rubber covered, No. 16, brewery cord
- *h*) No. 18, lamp cord, green and yellow
- *j*) S.C.C. copper magnet, enameled, sizes Nos. 16 to 26 inclusive

Electrical Shop — Motor and Testing Equipment

ANNUNCIATORS
- *a*) Automatic needle drop
- *b*) Gravity drop
- *c*) Manual needle drop

ARMATURES — burnt out, for repairing

(Continued on page 34A)

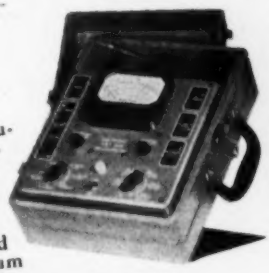
Dependable...Rugged INSTRUMENTS

for electrical and electronic instruction

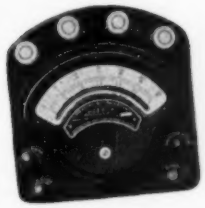
Standardize on WESTON instruments throughout your electrical courses, and thus be sure your students are thoroughly familiar with the instruments they will use all through their working careers. Accurate, economical, rugged and dependable—types available for all laboratory and classroom needs. Literature on request. WESTON Electrical Instrument Corporation, 601 Frelinghuysen Avenue, Newark 5, New Jersey.

ELECTRONIC ANALYZER

Three-in-one instrument. Provides self-contained Volt-Ohm-Milliammeter, high impedance electronic Volt-Ohmmeter, and probe type Vacuum Tube Voltmeter for use to 300 megacycles.



Model 769



Model 280

D-C MINIATURE INSTRUMENTS

Single and multi-range voltmeters, ammeters, voltammeters available. Accuracy within 1%. Hand calibrated scales. Knife-edge pointers, mirrored scales eliminate parallax errors.

SUPER-SENSITIVE ANALYZER

Volt-Ohm Milliammeter, 26 ranges, temperature compensated, D-C voltage ranges have either 1000 or 20,000 Ohms per volt sensitivity. Precision resistors used throughout. Solid oak carrying case. Small, light, compact.

Model 779

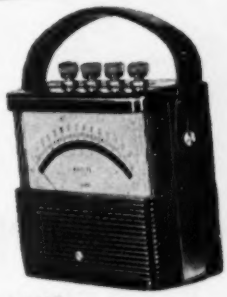
Model 697

VOLT-OHM-MILLIAMMETERS A-C D-C

Carefully selected group of ranges for A-C, D-C voltage measurements, direct current and resistance values. 1000 Ohms per volt sensitivity. Self-contained battery . . . equipped with test leads.

D-C PORTABLE INSTRUMENTS

Highly shielded single and multi-range voltmeters, ammeters, milliammeters and microammeters. Temperature compensated . . . hand calibrated mirror scales. Accuracy within ½ of 1%.



Model 931

STUDENT GALVANOMETER

Available with or without base. Widely used in school instruction where dependability and low cost are paramount. Sensitivity: 22 microamperes. Resistance: 23 Ohms. Scale: 30-0-30. Medium and extreme sensitivity models also available.

Model 375

D-C MINIATURE PORTABLE INSTRUMENTS

Rugged, serviceable for all-around use. Available in single, double, and triple ranges for voltage measurements; single and double ranges for current measurements. Accuracy 2%.

Model 489

WESTON INSTRUMENTS

(Continued from page 32A)

BATTERY CHARGER — commercial

CIRCUIT BREAKERS
- *a*) Air, single pole, overload, 25 amp., 550 volt
- *b*) Air, single pole, underload, 15 amp., 550 volt

CONTROLLERS
- *a*) For multiple-speed motor
- *b*) For 1 h.p., 110-volt series motors

GENERATORS
- *a*) Motor-generator set, 10 h.p., to supply 110-volt d.c. for testing purposes, battery charging, etc.
- *b*) Generator, 6-volt d.c. coupled to an a.c. motor for 6-volt circuit testing
- *c*) Auto generators of different makes

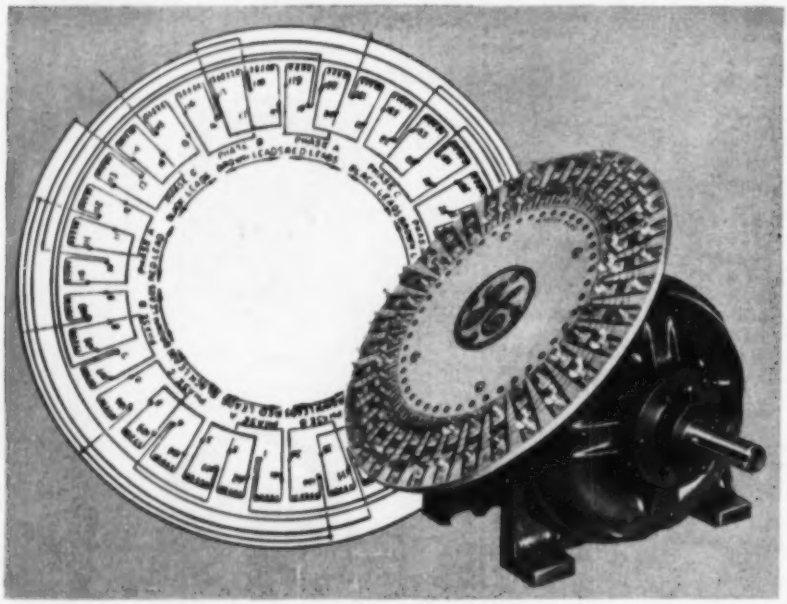
GRAVITY CELLS

MAGNETS — testing, 10,000 ohm

METERS
- *a*) Ammeter, standard, 60 amp., a.c.
- *b*) Ammeter, standard, 60 amp., d.c.
- *c*) Ammeter, student, 60 amp., a.c.
- *d*) Ammeter, student, 60 amp., d.c.
- *e*) Voltmeter, standard, 0–10 volt, d.c.–a.c.
- *f*) Voltmeter, standard, 110–220
- *g*) Voltmeter, standard, 125 volt
- *h*) Voltmeter, standard, 125 volt, d.c.
- *j*) Voltmeter, student, 110 volt, d.c.
- *k*) Voltmeter, student, 110 volt, a.c.
- *l*) Wattmeter, standard, 110–220 volt, 30–60 amp., d.c.–a.c.
- *m*) Wattmeter, student, 110–220 volt, 30 amp., a.c.–d.c.
- *n*) Watt-hour meter, 125 volt, 5 amp., a.c., single phase, various makes

MOTORS
- *a*) Auto starter, different makes
- *b*) Burnt out, fractional h.p., 110 volt, 60 cycle, for repairing
- *c*) Compound, 1 h.p., 110 volt, d.c.
- *d*) Multiple speed, 1 h.p., 3 phase, 220 volt
- *e*) Series, 1 h.p., 110 volt, d.c.
- *f*) Shunt, 1 h.p., 110 volt, d.c.
- *g*) Split phase and repulsive, a.c., 110 volt, single phase, assorted
- *h*) Split phase induction motors, fractional h.p., 110 volt, 60 cycle, different makes
- *j*) 3 phase, 1 h.p., a.c., 220 volt, various makes
- *k*) 3 phase, 2 h.p., 220 volt, a.c., various makes
- *l*) Universal, fractional h.p., 110 volt, different makes
- *m*) Universal, variable speed, ½ h.p.

PLATFORM SCALE — 100 lb. capacity
- *c*) Malleable-iron C, 4, 6, and 8 in.



Theory and application combined

Study of induction-motor circuits speeded with G-E 72-Terminal Induction Motor

OVER 20 RATINGS are possible with the G-E 72-Terminal Induction Motor. Designed so the student can get actual practice in selecting circuits for combinations of phase and speed, with this equipment the student can test various combinations for comparative torque, hp output, efficiency, power factor, and other characteristics.

TEN MOTORS IN ONE is actually what the student has at his disposal as the motor can be wired for ten different combinations of phase, voltage, and number of poles.

For more information about how the G-E 72-Terminal Induction Motor can help you introduce induction-motor design and connection contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEC-659 to General Electric Co., Section 687-108, Schenectady 5, N. Y.

YOUR COPY of this 16-page bulletin, GEA-5526, containing information on the specially designed G-E Educational Equipment for electrical laboratories is available on request.

GENERAL ELECTRIC

COURSE OUTLINE FOR SERVICE STATION ATTENDANTS

(Continued from page 31A)

service station attendant. A check mark after each particular item indicates that it has been completed satisfactorily. The work is divided into two parts: *Driveway* and *Lubrication*

Part One: Driveway

ORDER OF SERVICE:
1. Windshield sales and service
2. Gasoline sales and service
3. Under-hood inspection and sales
4. Motor oil sales and service
5. Radiator sales and service
6. Battery sales and service
7. Settlement of purchase
8. Practice work

TIRE SERVICE:
1. Air standard sales and service
2. Dismount car tires and tubes
3. Repair inner tubes (cold patch, hot patch)
4. Mount car tires and tubes
5. Remove and mount wheels
6. Operate hydraulic jack
7. Tire chains
   - *a*) Put on and remove
   - *b*) Emergency chain repairs
8. Practice work (tire service)

STATION MAINTENANCE:
1. Clean driveway
2. Clean pump island
3. Clean rest room

RELATED INFORMATION:
1. Nature of service-station business
2. The petroleum industry
3. Importance of good housekeeping

ATTENDANT'S ROUTINE FOR GASOLINE SALES:
1. Approach
2. Pumping gasoline

(Continued on page 36A)

up to 50% Greater Earnings

for Mechanics educated to the use of modern, time-saving tools!

● That is right . . . "Up to 50% greater earnings" . . . easily in reach of the youngsters who are receiving training today as the mechanics of tomorrow.

Sounds pretty strong! . . . *until you know the facts.* 30 years of unique, *first-hand* experience with the working mechanics of America have taught us the *facts* . . . given us countless case histories of the miracle that takes place in a man's productivity . . . *and his paycheck* . . . once he "sees the light" . . . and gives himself all the advantages modern tool equipment can provide.

It is a tradition (and a fact) that "good mechanics appreciate good tools."

It is a *far more important fact* that hundreds of thousands of man-hours (and pay-check dollars) are wasted *daily* through lack of the right tools for the job . . . *engineered* tools, fast, safe, energy-conserving, accurate!

Hard to believe *but we have seen* . . . again and again and again . . . young mechanics with brief experience *but excellent tool equipment* swiftly outstrip, in work and pay, able veterans who "didn't need all that stuff."

We honestly wonder if, in the education of tomorrow's mechanic, there is anything more vital to his career—his earning—his pride-of-craft . . . than to deeply impress on him the importance of a *complete* kit of *quality* tools . . . and to train him with such tools!

SNAP-ON TOOLS CORPORATION

8074-C 28th Avenue, Kenosha, Wisconsin

Send for FREE *Catalog*

The 104-page Snap-on catalog is a useful handbook of 4000 hand and bench tools for service maintenance and production operation. Free to instructors and school officials—write for it today.

Snap-on is the trademark of Snap-on Tools Corporation

COURSE OUTLINE FOR SERVICE STATION ATTENDANTS

(Continued from page 34A)

3. Windshield and rear window
4. Oil check
5. Radiator check
6. Extra sales possibilities

Part Two: Lubrication

LUBRICATION:

1. Fill lube guns
2. Operate hydraulic lift
3. Lubricate chassis (high pressure gun)
4. Change and flush crankcase
5. Drain and flush transmission
6. Drain and flush differential
7. Lubricate covered springs
8. Inspect and fill master brake cylinder
9. Under-hood lubrication
10. Service air cleaner (wire gauge and oil bath type)
11. Lubrication procedure

INSTALLATION AND SERVICE:

1. Remove and install batteries
2. Install battery cradles and hold-downs
3. Install battery cables
4. Charge batteries
5. Replace fan belts
6. Remove and clean spark plugs
7. Install spark plugs
8. Install windshield wiper arms and blades
9. Replace radiator hose
10. Replace oil filter (sealed cartridge and element types)
11. Replace lamp bulbs

RELATED INFORMATION:

1. Types, characteristics, and qualities of automotive greases
2. Principles and functions of batteries
3. Organization and use of lubrication manual

Developing Personal Habits and Attitudes in Service Occupations

CONTENT OR EDUCATION EXPERIENCE:

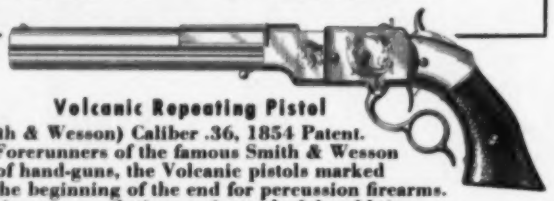
1. Courtesy
2. Personal grooming
3. Poise and posture
4. Tact
   a) Meeting people
   b) Giving directions
   c) Taking instructions
   d) Introductions
5. Delivery and errand procedures
   a) Carrying bundles, luggage, etc.
6. Maintaining records
   a) Bills
   b) Sales
   c) Hours
   d) Adjustments
7. Regulations
   a) Safety
   b) Administration
   c) Fire
   d) Protection
   e) Operator's license
8. Health habits
   a) Recreation
   b) Eating
9. Operation of
   a) Bicycles
   b) Elevators
   c) Passenger cars
   d) Delivery trucks

METHODS OF TEACHING AND LEARNING (INCLUDING INSTRUCTION SHEETS AND VISUAL AIDS):

1. Lecture
2. Assigned readings
3. Class discussion
4. Observation of actual situations and practices
5. Visit by
   a) Management representative

(Continued on page 39A)

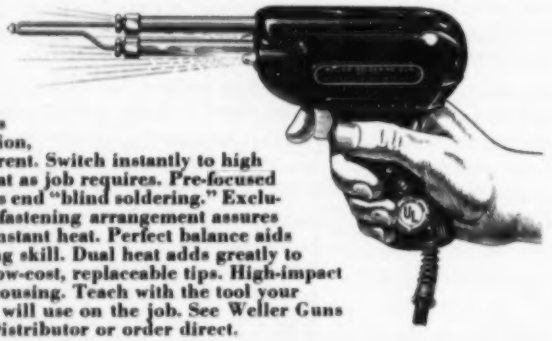
Famous Guns



Volcanic Repeating Pistol
(Smith & Wesson) Caliber .36, 1854 Patent. Forerunners of the famous Smith & Wesson line of hand-guns, the Volcanic pistols marked the beginning of the end for percussion firearms. Their design was revolutionary; instead of the old-time cap and ball, they used special *self-contained* cartridges.

Harpers Ferry Flintlock Pistol,
Caliber .54, 1806 Model. Famous for its accuracy, balance and graceful lines, this handsome pistol was used by both Army and Navy. The Harpers Ferry (Virginia) Armory, in which the pistol was made, was raided by abolitionist John Brown in 1859, and was burned during the Civil War.

Instant-Heating Weller Soldering Gun
Instant-heating Weller Guns simplify soldering instruction, save time and current. Switch instantly to high or low heat as job requires. Pre-focused spotlights end "blind soldering." Exclusive tip-fastening arrangement assures full, constant heat. Perfect balance aids handling skill. Dual heat adds greatly to life of low-cost, replaceable tips. High-impact plastic housing. Teach with the tool your students will use on the job. See Weller Guns at your Distributor or order direct.



Weller

Get SOLDERING TIPS, new Weller Handy Guide to faster, easier soldering. 24 pages, fully illustrated. Price 10c from your Distributor, or order direct. Special discount for classroom quantities.

BETTER FROM GRIP TO TIP!

SOLDERING GUNS 811 Packer Street, Easton, Pa.

The Finest Soldering Tool for the Finest Craftsmen

THE ONLY 15" DRILL PRESSES WITH 5/8" CAPACITY

BOICE-CRANE Heavy Duty Helmet Head Series

50% thicker column (3/16" walls). Greater rigidity counts for closer precision at the chuck. 20% larger quill and deeper head reduces wear from side thrust on deep-hole drilling. 4" or more of the quill is always supported. Rugged steel (not die cast) 6-tooth (involute) splined drive. Far more sensitive powerful quill feed. 50 High and Slow Speed Bench and Floor Models, 1-2-3-4 Spindles. 5 speeds—Easy speed changing. Various options on work tables. Heads and parts sold separately for special setups. Tapping heads, foot feeds and accessories.

CHALLENGER SERIES DRILL PRESSES

Exclusive two-way drive aligner-belt tensioner. Perfect alignment and tension instantly released for speed changing without wrenches or tools. 6-tooth splined drive. Every splined-drive part made of steel for quiet running and longer life. Four heavy grease-sealed ball bearings. Massive head and positive, easy, quick acting non-mar quill and column locks. Popular priced. 5 speeds in two ranges; 500, 925, 1750, 3250 and 5500 in the high, and 425, 775, 1330, 2200 and 3340 in the low.

Faster, Smoother Cutting of Any Industrial Material

BOICE-CRANE 14" HIGH SPEED METAL CUTTING BAND SAW

Operates at from 92 to 4100 blade f.p.m. Close balance, and light but strong Textolite wheels, permit up to twice the wheel speeds and cutting speeds of other 14" machines. Has the accuracy demanded in tool, die and pattern work. Clears 7-3/4" under the guide. Strong, one-piece welded steel frame. Entirely enclosed except at cutting point. Blade guides adjust by single control, and with full safety, even when running. Single and 8-speed back-geared models.

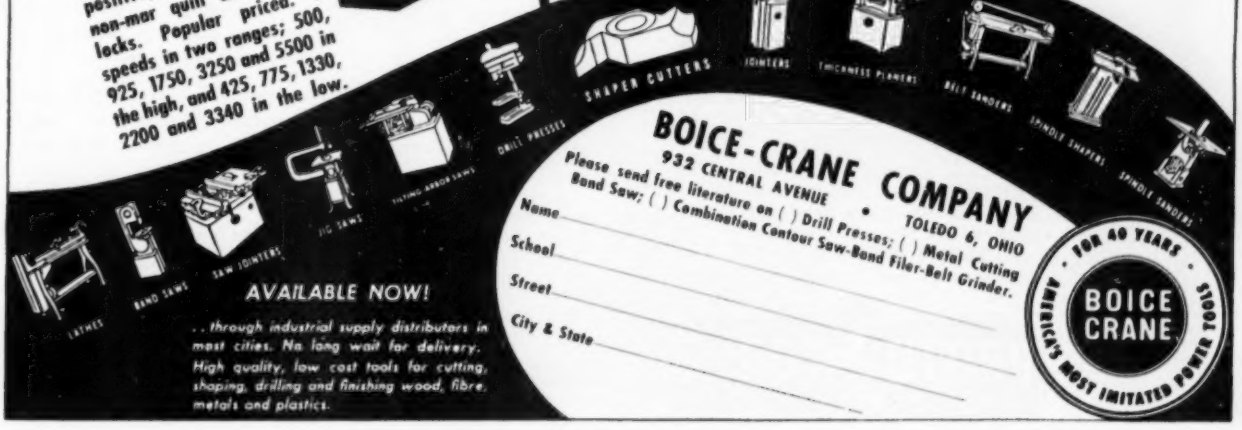
THE ONLY LOW PRICED, HIGH QUALITY COMBINATION CONTOUR SAW-BAND FILER-BELT GRINDER

Effect the sensational savings made possible by inside and outside contour machining of all industrial materials.

With extreme precision and continuous cutting with no back-stroke, it slices away hard alloys and carbon steels in 1/10 the time required by slow milling, drilling, shaping and hand filing.

Produce maintenance and production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts and stamping, forming and trimming dies in minutes instead of hours. File broaching and flash removal in 1/9 the time required by hand, and 1/4 the time required by reciprocating filing machine. 8 speeds 92 to 4100 blade f.p.m.

Does all the same types of work that machines costing $1800.00 will do, yet costs less than $500.00.



AVAILABLE NOW!

. . through industrial supply distributors in most cities. No long wait for delivery. High quality, low cost tools for cutting, shaping, drilling and finishing wood, fibre, metals and plastics.

BOICE-CRANE COMPANY
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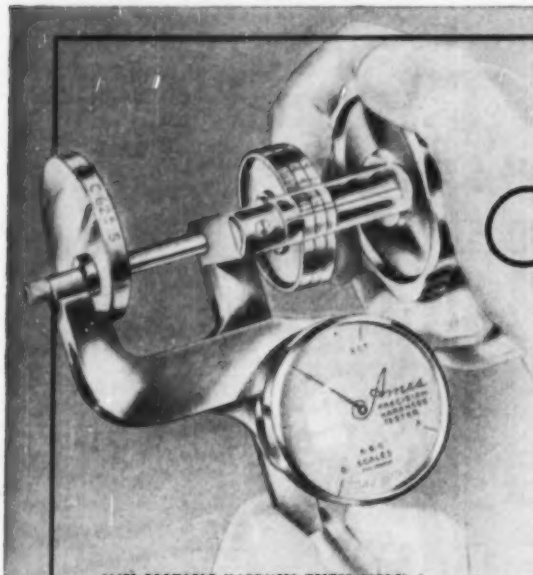
Please send free literature on ( ) Drill Presses; ( ) Metal Cutting Band Saw; ( ) Combination Contour Saw-Band Filer-Belt Grinder.

Name _____
School _____
Street _____
City & State _____

FOR 40 YEARS
BOICE CRANE
AMERICA'S MOST IMITATED POWER TOOLS



AMES PORTABLE HARDNESS TESTER MODEL 1 WEIGHS ONLY 1½ POUNDS AND HAS 1" CAPACITY. OTHER MODELS OF GREATER CAPACITY. FURNISHED COMPLETE WITH BALL AND DIAMOND PENETRATORS, ANVILS, AND TEST BLOCKS, IN WOODEN CARRYING CASE, FOR TESTING DIRECTLY IN ALL ROCKWELL SCALES.

TEACH ROCKWELL HARDNESS TESTING IN THE CLASSROOM WITH

Ames PORTABLE HARDNESS TESTERS

All engineering students should understand Rockwell Hardness Testing of metals. It is an important subject which can now be taught in the classroom with Portable Hardness Testers.

They are light in weight, easy to use, durable and very accurate. Hundreds of them now used in industry. Students become familiar with hardness testing and many practical applications. Write for Hardness Tester booklet and complete information.

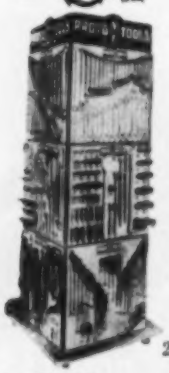
AMES PRECISION MACHINE WORKS

Makers of Precision Bench Lathes and Milling Machines

WALTHAM 54, MASSACHUSETTS

Sir Launcelot Wins All His Duels ...'cause

PROTO means PROfessional TOols!



One reason why PROTO tools are *professional* tools is that they are made from superior PROTO-specified alloy steels. Known as PROTOLOY, these special alloy steels provide great strength, hardness, toughness—and extra long life. Scientific heat treatment, advanced designs, accurate manufacture, a meaningful guarantee and completeness of line are more reasons why experts prefer PROTO. For truly *professional* tools, see your PROTO dealer. Send 10¢ for 68-page catalog to

PLOMB TOOL COMPANY
2204R Santa Fe Ave., Los Angeles 54, Calif.

The PROTO Line Includes Wrenches, Pliers, Screwdrivers, Punches, Chisels, Sockets & Handles, and Many Others.

Eastern Factory—Jamestown, N. Y.

5283

PROTO TOOLS
LOS ANGELES

IT'S EASIER TO TEACH accurate workmanship with the Kalamazoo METAL CUTTING BAND SAW

Model 610 cuts 6" round and 6" x 10" flat. Coolant equipment available.

That's why the Kalamazoo, so popular in industry, is used by so many schools.

Accuracy of a few thousandths is easy to maintain, whether cutting bars, rounds, angles or odd shapes. There's minimum kerf . . . no burr. What's more, the Kalamazoo is *safe* to use. Saw blade is almost completely enclosed . . . no exposed pulleys or gears.

Three sizes available. Each can be had with casters for complete portability. Send for full details *now*.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

319 HARRISON ST., KALAMAZOO, MICHIGAN

COURSE OUTLINE FOR SERVICE STATION ATTENDANTS

(Continued from page 36A)

b) Representative of personnel services

6. Conference with experienced adults
7. Information sheets
8. Films
   a) Health
   b) Safety
   c) Grooming
   d) Courtesy

PUPIL ACTIVITY:

1. Teacher demonstration and student participation
   a) Courtesy
   b) Meeting people
   c) Taking and following instructions
   d) Giving introductions

NEEDED SHOP AND OTHER EQUIPMENT:

1. Classroom facilities
2. Film projector screen
3. Film projector
4. Film strip projector

REFERENCES

"I Listened and Learned develops a new understanding of the value of cheerful, competent service station operation. Alive with 200 illustrations, service tips, and human interest material. Develops proper attitudes toward the job and customers — 202 pp., $3. Chek-Chart Corporation, 31 E. Congress Street, Chicago, Ill.

Service Man's Guide explains principles of lubrication and automotive design. Illustrations *take apart* such units as engines, clutch, transmissions, differential. Shows their work and lubrication requirements. A standard handbook — 191 pp., $4. Chek-Chart Corporation, 31 E. Congress Street, Chicago, Ill.

The ABC'S of Lubrication Service carries the reader step by step, through every stage of complete and correct lubrication from body hardware to shock absorbers — 42 pp., $4. Chek-Chart Corporation, 31 E. Congress Street, Chicago, Ill.

Servicing Automatic Transmissions. Concise, practical booklet explaining ways to service all makes of automatic transmissions — 8 pp. Free with purchase of ABC'S, $1 if ordered separately. Chek-Chart Corporation, 31 E. Congress Street, Chicago, Ill.

TBA Sales and Service Manual. A complete reference library in one book to enable you to cash in on the opportunities offered in the sale, installation, and service of all TBA items. Illustrated, $5. Chek-Chart Corporation, 31 E. Congress Street, Chicago, Ill.

Establishing and Operating a Service Station. Prepared by members of the petroleum industry, this booklet deals with such topics as location, layout, building, equipment, selling, stock control, maintenance, accidents, training, station records, credit management, development. United States Department of Commerce. For sale by the Superintendent of Documents, United States Government Printing Office, Washington, D. C., 35 cents.

Opportunities in Selling. The quality of your selling determines the amount of your profits. Twelve leading sales experts tell of proven, successful methods of selling which you can use — 97 pp., 25 cents. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Super Service Station. A monthly magazine devoted to the news of the industry. Articles on attracting, pleasing, selling, and satisfying customers. Stories on tested ways dealers use to make more money. Subscription, $3 per year. "Super Service Station" Magazine, 400 West Madison Street, Chicago 6, Ill. *For the Man at the Pump.* A collection of over 600 ideas and 31 successful sales plans for increasing profits — 144 pp. This book free with subscription to *Super Service Station.*

The Automobile User's Guide. A booklet containing 196 practical suggestions for improving the operation of an automobile. Answers questions on how to save gasoline, tires, and repair bills — 64 pp. Free. Customer Research Staff, General Motors Corporation, Detroit 2, Mich.

When to Drain Oil. Booklet by an authoritative source shows how dirty oil ruins engines. Explains why and when motorists should drain oil. Price, $1. Petroleum Educational Institute, 9020 Melrose Avenue, Los Angeles 46, Calif.

Outline and Progress Record for Service Station Attendant

Name: .....

Date entered: .....

Date completed: .....

School group: .....

INFORMATION:

This outline covers the material in con-

(Continued on page 46A)

Educational, Instructive, Entertaining

A "MUST" FOR YOUR TRAINING PROGRAM

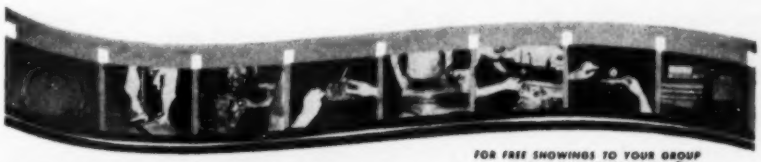
THE STARRETT 16MM SOUND MOVIE

"THE TOOLS AND RULES FOR PRECISION MEASURING"

FEATURING

- Highlights in the history of precision measuring
- New Tools and Instruments just introduced by Starrett
- Precision Measuring from basic rules to latest precision methods
- New, simplified instruction: How to use and read the Micrometer and Vernier

Here is a motion picture of vital interest to shop executives, mechanics, apprentices, vocational students — to all who play a part in modern precision production. Tells the absorbing story of precision measuring in 30 interest-packed minutes . . . how precision tools control quality in mass production . . . showing the latest methods and equipment in practical use. This outstanding educational film will help everyone to do a better, faster job of precision measuring. It's a "must" for apprentice training and shop classes. Arrange today for a free showing to your group. Fill in the coupon. Mail it today.



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Metalworking Equipment, Tools, and Supplies

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

AIR COMPRESSORS — for machine shop, foundry, or forge shop
ANVIL — 100 lb.
ARBOR PRESS — bench or pedestal type
BARROWS
- a) Coke
- b) Foundry
- c) Scrap

BELT LACER
BENCHES
- a) Coremaking
- b) For metal working, iron or steel legs. Tops, metal or hardwood lumber, 1¾ in. to 2½ in. thick
- c) Molding

BLACKBOARD — permanent or portable
BLOWERS — for furnaces, forges, etc.
BLOWTORCH — 1-qt. size
BOOKCASE — for reference books, catalogs, etc.
BORING BAR
BORING MILL — vertical or horizontal
BULLETIN BOARD
CABINETS — Wood or metal, for filing class records, instruction sheets, drawings, etc., and for tools and supplies
CASEHARDENING BOXES
CENTERING MACHINE
CHAIN HOISTS — differential, duplex or triplex
CHAIRS — Teachers', and tablet arm if needed for related-subjects room, or for demonstration section
CHUCK
- a) Drill, selected sizes
- b) Lathe, combination, 4 jaw, selected sizes
- c) Lathe, independent, 4 jaw, selected sizes
- d) Lathe, universal 3 jaw, selected sizes
- e) Milling machine, universal

CORE OVEN — for foundry
CRANES AND HOISTS — air, electric, or hand, of the jib, traveling, or portable type
CUPOLA — for foundry, coke, or electric, ¼- to 1-ton capacity
DESK — teacher's, with drawer compartments
DIE-FILING MACHINE
DIVIDING HEAD
DRILLS
- a) Bench, hand
- b) Breast
- c) Electric, portable
- d) Hand
- e) Post, hand or power
- f) Radial
- g) Sensitive
- h) Upright, power

FLASKS — 2 or 3 part, steel or snap type
FORGE — coal or gas, with hand- or electric-driven blower
FURNACES
- a) Annealing
- b) Bench
- c) Brass and soft metal
- d) Combination bench
- e) Casehardening
- f) Cyanide
- g) Gasoline
- h) Heat-treating
- j) Melting

GEAR-CUTTING MACHINE
GRINDER
- a) Bench, hand or power driven
- b) Combination grinder, buffer, and polisher
- c) Emery, bench or pedestal type
- d) Face, with magnetic chuck
- e) Portable tool post
- f) Precision, for external and internal grinding
- g) Universal tool cutter, drill and reamer grinder
- h) Wet tool

HACK SAW — motor or belt driven
HAND PICKS — for cleaning inside of cupola, 1¼ to 2½ lb.
HARDNESS TESTING MACHINE
LATHES — belt or individual drives
- a) Automatic
- b) Bench, 6-in. to 11-in. swing, 11 in. to 36 in. between centers
- c) Change gear, 9-in. to 14-in. swing, 18 in. to 36 in. between centers
- d) Quick-change gear, 9-in. to 16-in. swing, 18 in. to 36 in. between centers
- e) Semiquick-change gear, 9-in. to 18-in. swing, 18 in. to 42 in. between centers
- f) Turret
- g) Metal spinning

MILLING MACHINE
- a) Plain, cone or motor-driven type
- b) Universal, cone or motor-driven type

NIBBLING MACHINE
PIPE CUTTER
PLANER — belt or motor driven
POWER HAMMER — for forging operations
PUNCHES — metal, hand, or power
PYROMETER
PYROSCOPE
RELIEVING ATTACHMENT FOR LATHE
SAND SIFTER — for foundry, hand or power
SANDBLAST OUTFIT — with cabinet
SCALE
- a) Counter for machine shop
- b) Platform, for foundry, 1000-lb capacity

SHAPER
SNAP-FLASK JACKETS — to fit snap flasks used
STRAIGHTENING PRESS
SURFACE PLATES
SWAGE BLOCK AND STAND — for forge shop
TAPER ATTACHMENT FOR LATHE
TRUCK — warehouse
TUMBLING BARREL — for foundry
VISES
- a) Blacksmith
- b) Drill press
- c) Machinist
- d) Pipe
- e) Planer
- f) Shaper

WELDING OUTFIT
- a) Acetylene
- b) Electric

Metalworking — Small Tools

ARBORS
- a) Drill chuck to suit requirements
- b) Reamers, various sizes
- c) Shell tool, various sizes
- d) Straight shank for shell reamers and shell drills, selected sizes
- e) Taper shank for shell reamers and shell drills, selected sizes

BEARING SCRAPER
BELLOWS — for foundry class
BEVEL PROTRACTOR
BROOMS AND FLOOR BRUSHES — for shop and foundry
BRUSHES
- a) Bench
- b) Core box
- c) Core painting
- d) Hard brushes for foundry
- e) Floor
- f) Soft brushes for foundry

BULB SPONGES — for molders
DRAW PINS — for molders
CALIPERS
- a) Hermaphrodite, 4 in. and 6 in.
- b) Inside, 4 in. and 6 in.
- c) Outside, 4 in. and 6 in.

CANS
- a) Oil, ½ pt., 1 pt., and 10 gal.
- b) Waste

CENTER TESTERS
CHISELS
- a) Cape, 3/16 in. and 5/16 in.
- b) Cold, 3/16 in. and ¼ in.
- c) Diamond point, 3/16 in. and ½ in.
- d) Roundnose, 3/16 in. and ½ in.

CLAMPS
- a) 4 in., 6 in., 8 in., and 10 in.
- b) Flask, for foundry
- c) Strap, various sizes

CAKE FORKS — for foundry
COLLETS
- a) For milling machine, selected sizes
- b) For lathe, selected sizes.

COMBINATION SQUARES — with hardened head and blade, and protractor head, 9 in. and 12 in.
COUNTERBORES — straight and tapered shanks, selected sizes
COUNTERSINKS — for metal
CRUCIBLE TONGS — to fit crucibles
CRUCIBLES — selected sizes
- a) Shanks, single end to fit ladles
- b) Shanks, hand, to fit ladle bowls

CUTTERS — angular milling, bevel gear, concave milling, convex milling, end milling, face milling, formed milling, grooving, involute gear teeth, key seat, side milling, and metal slitting
DIVIDERS — Spring, 4 in. and 6 in.
DRILLS
- a) Drifts, different sizes
- b) Sleeves, different sizes
- c) Stand for Nos. 1 to 60
- d) Stand for 1/16 in. to ½ in. by 64ths

DRILLS
- a) Center
- b) High speed, taper shank, various sizes
- c) Jobbers, straight shank, 1/16 in. to ½ in. by 64ths
- d) Ratchet
- e) Straight shank, Nos. 1 to 60
- f) Taper shank, ½ in. to 1 in. by 16ths

FILE CARDS
FILES
- a) Die sinkers, various shapes
- b) Flat bastard, 8 in., 10 in., 12 in., and 14 in.
- c) Half round, double cut, 6 in., 8 in., 10 in., and 12 in.
- d) Hand, smooth, 8 in., 10 in., and 12 in.
- e) Mill, smooth, 8 in., 10 in., and 12 in.
- f) Round bastard, 8 in., and 10 in.
- g) Square bastard, 8 in., and 10 in.
- h) Swiss, various shapes
- j) Three-square, double cut, 6 in.
- k) Warding, double cut, 6 in.

FIRST-AID CABINET AND SUPPLIES
FORGE TOOLS — drift pins, flatters, fullers, hand and handle punches, hardies, hot and cold cutters, set hammers, and swages for the forge shop
GATE STICKS — maple for foundry
GAUGES
- a) Center
- b) Depth
- c) Drill and wire
- d) Screw pitch, select kinds
- e) Surface
- f) Thickness

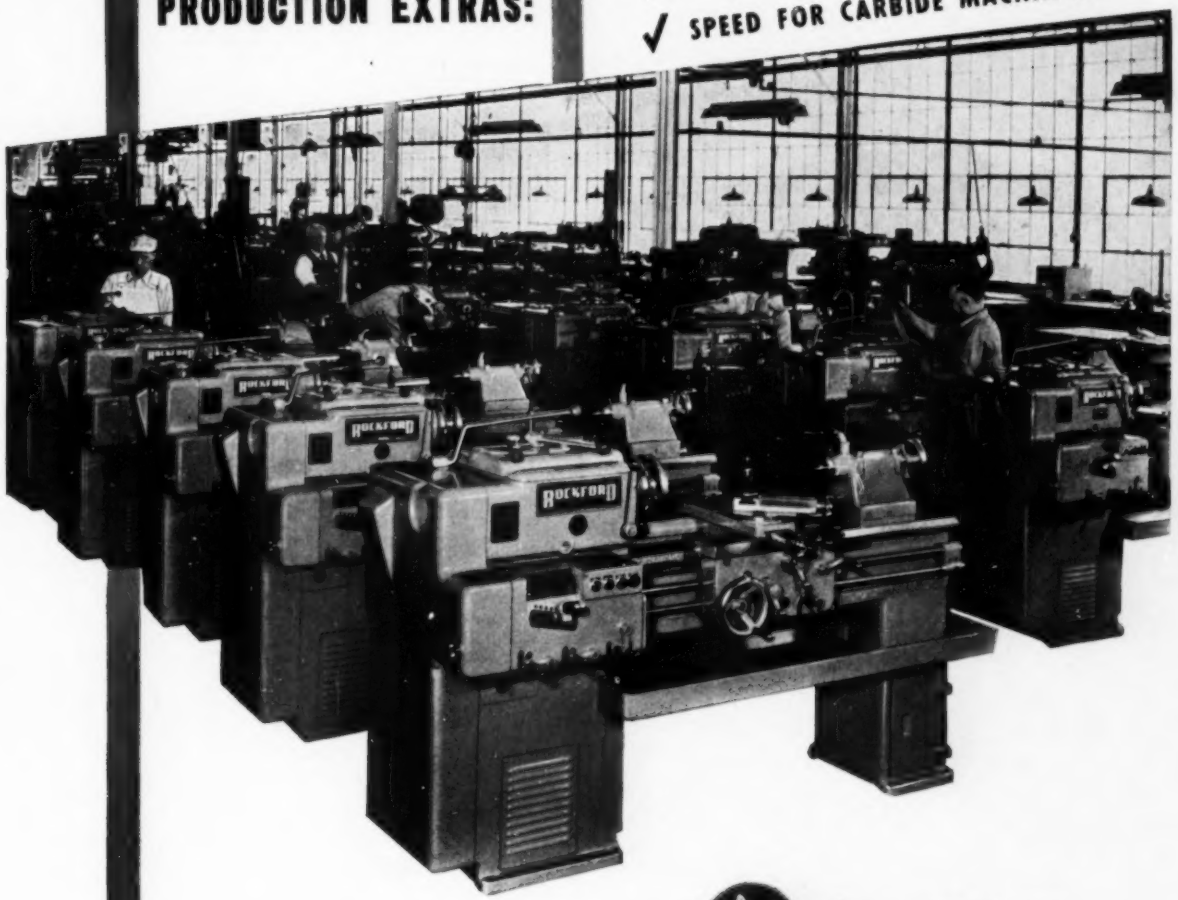
GLOVES — asbestos, for foundry
GOGGLES
- a) For machine shop
- b) For foundry

HACK SAW
- a) Blades, hand, 18T, 10 in.
- b) Blades, power, 14T, 12 in.

(Continued on page 42A)

Check THESE PRODUCTION EXTRAS:

✓ ALL-GEARED HEAD
✓ QUAD-V-BELT MOTOR DRIVE
✓ SEPARATE LEAD SCREW, FEED SHAFT
✓ SPEED FOR CARBIDE MACHINING



Buy THE MOST LATHE FOR MORE WORK

● These are but a few of the production extras offered on Rockford Economy Lathes — and in a price class usually found only for smaller, lighter tools.

Rockford Lathes have ample reserve to take care of a wide range of straight-production, tool room or maintenance work. Features include 5 H.P. motor, 1-9/16" spindle hole, and quick change gear box providing carriage feeds from .004" to .060" and full range of threads from 4 to 56.

Twelve spindle speeds are easily and quickly selected through convenient shift levers. The spindle and all head shafts run in precision Timken bearings. These features assure capacity for close work, fast set-up, savings in non-productive time, and easier work for the operator.

When you're buying lathes, look for the *most* lathe, to give you *more* work. A Rockford representative can give you this complete story, price and all. Why not call him today and be set for those lathe jobs.

Ask for a copy of our Bulletin 900G.

MEDIUM SIZED
ECONOMY PRICED

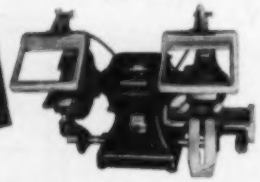
ROCKFORD ECONOMY LATHES—16" and 18"

516

ROCKFORD MACHINE TOOL CO. • ROCKFORD, ILLINOIS

EQUIP NOW FOR THE YEARS AHEAD WITH STANLEY ELECTRIC TOOLS

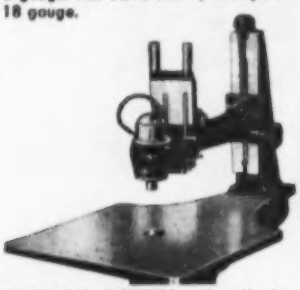
DRILLS — available in 17 sizes in capacities to 1½". No. 24 shown, ¼" capacity.



BENCH GRINDERS — for light or heavy duty. Six sizes from ⅛ to 1 h.p. No. 677 Tool Grinder shown, ⅛ h.p.

UNISHEARS — 10 models with capacities from 18 to 6 gauge. No. U218 shown, cuts up to 18 gauge.

SAWS — four sizes, 6", 7", 8", and 9". Many exclusive features. No. W65 shown, 6" blade.



OVERARM ROUTERS — for Maximum versatility. No. OR55A-1 Combination Router and Shaper shown.

ROUTERS — high speed for precision work. Four models from ½ to 3 h.p. RS-8 shown, ½ h.p.

NO. 61 DOVETAIL ATTACHMENT — Dovetail joints easily accomplished with this Attachment and Stanley Router.

Equip your shop now with Stanley Electric Tools. Good equipment is necessary for the proper training for your students in the years ahead. The advanced design and quality construction of Stanley Electric Tools make them the ideal choice for all school shops. Reasonable first cost and long, steady performance assure maximum economy. Send the coupon today for the complete catalog. Stanley Electric Tools, Educational Department, 411 Myrtle St., New Britain, Conn.

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Reg. U.S. Pat. Off.
Hardware • Tools • Electric Tools • Steel Strapping • Steel

EYESHIELDS — safer, more sanitary than goggles. No. 600 shown, 4" x 6" window, illuminated. Adaptable for use on most grinders.

Stanley Electric Tools, Educational Dept.
411 Myrtle St., New Britain, Conn.

Gentlemen: Please send me your complete catalog of Stanley Electric Tools.

Name.....

School.....

Street.....

City & State.....

Subject you teach.....

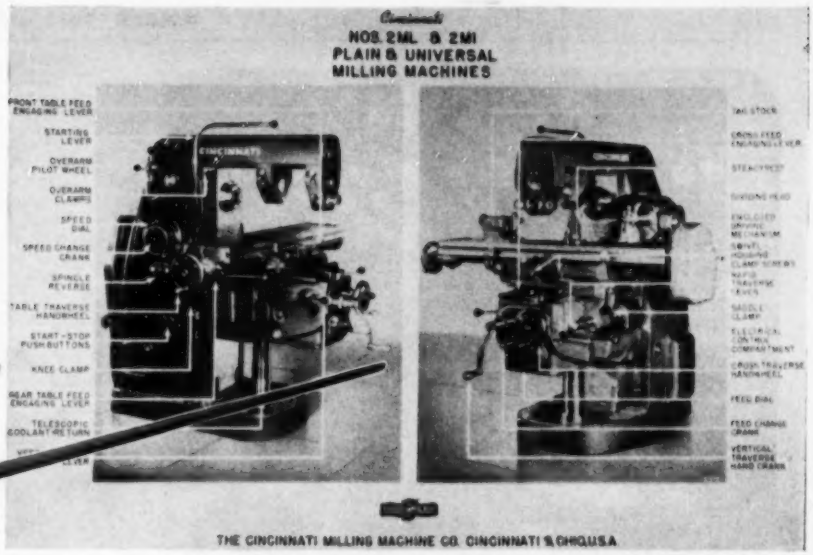
(Continued from page 40A)

c) Frames, adjustable
HAMMERS
a) Babbitt
b) Ball peen, 13 oz., 16 oz., or 20 oz.
c) Blacksmith's, various kinds
d) Riveting, 9 oz., and 12 oz.
e) Setting
INDICATOR
a) Center
b) Universal or universal dial test
c) Speed
KNURLING TOOL — with assorted knurls
LADLES
a) Bull
b) Hand bowls
c) Melting
LATHE DOGS — ½ in., ¾ in., 1 in., 1½ in., 2 in., 2½ in., and 3 in.
LEGGINGS — fireproofed duck, to protect students when pouring in foundry
LEVEL — 6-in. bench
LIFTING SCREWS — for molders
MALLETS — wood or soft
MANDRELS — selected sizes
MICROMETERS — inside, 1½ in. to 8 in.; outside, 0 to 1 in.; outside, 1 in. to 2 in.; outside, 2 in. to 3 in.
MOLDING BOARDS
MOLDING STICKS AND TROWELS — various kinds
NIPPERS — end cutting, 5 in.
OIL STORAGE TANK — with pump
OILSTONES — medium and fine
PAILS — galvanized, 12-qt. capacity for foundry
PARALLELS
a) Adjustable
b) Steel, assorted sizes
PLIERS
a) Combination, 6 in.
b) Side-cutting, 6 in.
PUNCHES
a) Center, ¼ in. and ⅛ in.
b) Hollow, ½ in., ¾ in., and 1 in.
c) Pin, ⅛ in., 5/32 in., 3/16 in., 7/32 in., and ¼ in.
d) Prick, ¼ in.
RAMMERS — for foundry
a) Hand
b) Floor
REAMERS — various sizes
a) Adjustable
b) Hand
c) Taper pin
d) With taper shank
RIDDLES — ¼-in. and ⅛-in. mesh, 18-in. diameter, for foundry
RIVET SETS — assorted sizes
SCALES
a) Steel, 6 in., graduated 1/64 in. to ⅛ in.
b) Steel, 12 in., graduated to 32nds
SCREW DRIVERS — 6 in. and 9 in. blade
SCRIBERS
SHOVELS
a) Coke
b) Sand
SNIPS — tin, 3 in. straight and 3 in. curved
SOCKETS — for taper shanks, drill and tools, selected sizes
SOLDERING COPPERS AND HANDLES — 1-lb. size
SPRAY CAN — for molders
SPRINKLING CANS — galvanized iron, 16-qt. capacity, for foundry
SPRUE PICKS — for molders
SQUARES
a) Machinist's, 6 in.
b) Blacksmith's
STEEL FIGURES — ⅛ in.
STEEL LETTERS — ⅛ in.
SWABS — for molders
TAPELINE — steel, 25 ft.
TAPS AND DIES
a) Machine screws
b) Pipe
c) N.F. ¼ in. to ¾ in.
d) N.C. ¼ in. to ¾ in.
TONGS
a) Blacksmith's, various kinds
b) Pick up, for foundry
c) Shake out, for foundry
TOOL HOLDERS
a) Boring tools
b) Cutting-off tools
c) Planer
d) R.H. and L.H. offset shank
e) Shaper
f) Slotter
g) Straight shank
h) Threading
TOOL-HOLDER BITS — square, ¼ in., 5/16 in., ⅜ in., 7/16 in., ½ in.
TRAMMEL POINTS
V BLOCKS AND CLAMPS
WHEEL DRESSER
WRENCHES
a) Adjustable, 8 in. and 10 in.
b) Pipe, 8 in. and 12 in.
c) Tap, adjustable, various sizes

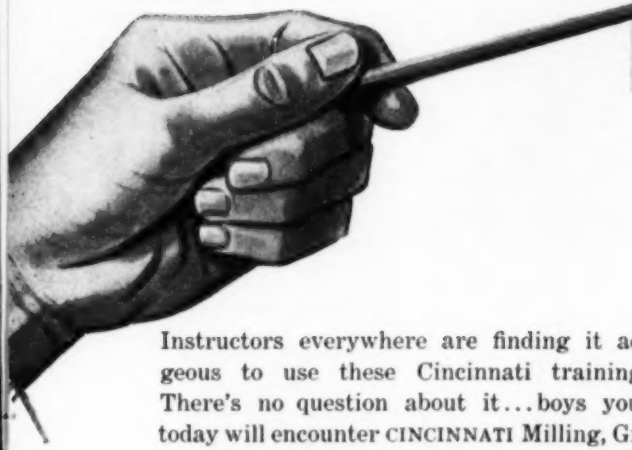
Metalworking — Materials and Supplies

ABRASIVE CLOTH — aluminum oxide. Grits 320 to 24, obtainable in sheets or rolls from 1 to 28 in. wide
ABRASIVE WHEELS
ACETYLENE GAS — in drums for welding
ALUMINUM
a) Pigs for foundry
b) Sheets, tubing, rounds, shapes, wire, etc.
BABBITT METAL
BEARING BLUE
BELT DRESSING
BELT LACING MATERIAL
BELT LEATHER
BOLTS
a) Carriage, selected sizes
b) Lag, selected sizes
c) Machine, selected sizes
d) N.F., selected sizes
e) Stove, flat or roundheads, selected sizes
BRASS
a) Bars, 3/32 in., ⅛ in., 5/16 in., and ¼ in. thick; ⅜ in. to 1 in. wide, 8 ft. to 10 ft. long, selected sizes
b) Round rods, 5/16 in. to ½ in. by 16ths, selected sizes
c) Sheets, 28 to 32 American gauge, 12 in. wide by 72 in. to 84 in. long, selected sizes

(Continued on page 44A)



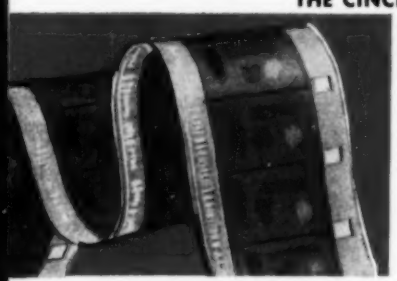
...and this lever elevates the knee



Instructors everywhere are finding it advantageous to use these Cincinnati training aids. There's no question about it...boys you train today will encounter CINCINNATI Milling, Grinding and Cutter Sharpening Machines in industry tomorrow. So why not take advantage of the material Cincinnati offers to school shop instructors? With these booklets and diagrams, students quickly grasp the fundamentals of machining and familiarize themselves more readily with the function and location of various units and controls of the machines. Copies will be sent to instructors free on request. Or they are available in quantities at a modest charge.

Please address all requests for training aids to the Technical and Service Publications Department.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



Two 16 mm color movies,
1) "Highway to Production,"
2) "Age of Precision," are available. Technically these two movies are not training aids, but they are highly informative and give the students a greater appreciation of the machine tool industry. If interested in movies, write us.

Instruction Charts of the type illustrated here will be sent to school shop instructors on request. The diagrams, enlarged photos indicating the principal units and controls, are useful for classroom discussions. They are available for the following machines:

- *No. 2ML and 2MI Milling Machines*
- *No. 2 Cutter and Tool Grinder*
- *12" Hydraulic Universal Grinder*

Explaining the CENTERLESS PRINCIPLE
With the Aid of a Wood Model
Look sharp at your cutters
Cutting Gear Teeth
CENTERLESS GRINDING

Educational Booklets on various phases of metal working and shop practice are a big help to the instructor. The more popular ones are tabulated below:

- *Milling Machine Practice.....No. M-773-1*
- *Cutting Gear Teeth.....No. M-1769*
- *Look Sharp at Your Cutters.....No. M-1657-2*
- *Principles of Centerless Grinding....No. G-503-1*
- *Explaining the Centerless Principle with the Aid of a Wood Model....No. G-509*

CINCINNATI

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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

RACINE
"Utility"
METAL CUTTING MACHINES

★ SAVE TIME
★ EASY TO OPERATE
★ FAST AND ACCURATE
★ FULLY HYDRAULIC

The ideal general purpose saw for cutting any metal from screw stock to tool steels up to 6" x 6" size.

The "Utility" is used in large and small industries, schools and institutions for general and special metal cutting work.

These saws are hydraulically operated for smooth oil-cushioned metal cutting. Completely guarded — no exposed gears or belts. Require a minimum of floor space. Models are available in Wet or Dry Cut styles.

Write us about your metal sawing problems — no obligation. Address Racine Hydraulics & Machinery Inc., 2080 Albert St., Racine, Wisc.

Investigate our complete line of Oil Hydraulic Pumps, Valves, and Systems. Write for new catalog P-14-E.

BUY DEFENSE BONDS

STANDARD FOR QUALITY AND PRECISION
RACINE TOOL and MACHINE CO.
RACINE
STANDARD FOR QUALITY AND PRECISION

(Continued from page 42A)

d) Strips, 1/32 in. and 1/16 in. thick, 1/2 in. to 1 1/2 in. wide, 50 ft. to a coil, selected sizes
e) Threaded rods, Nos. 6 to 10, in 24 in. lengths. Nos. 12, 14, 1/4 in., and 5/16 in., in 24 in. lengths, selected sizes
f) Wire, soft, 8, 11, and 14 American gauge, selected sizes
g) Wire, spring, 8 to 22 American gauge, selected sizes

CASEHARDENING COMPOUNDS

CHAPLETS — single and double head

COAL
a) Charcoal for foundry or forge
b) Coke for foundry
c) Forge

COPPER
a) Pigs, for casting alloys
b) Sheets, 8 to 25 American gauge, 30 in. by 60 in., selected sizes
c) Tubing, outside diameters, 3/16 in., 1/4 in., 5/16 in., 3/8 in., 1/2 in.; thickness of wall, 1/32 in.; lengths, 8 ft. to 12 ft., selected sizes
d) Wire, soft, 2 to 20 American gauge, in coils. Also in 1/4, 1/2, and 1 lb. spools, sizes 16 to 36, English gauge, selected sizes

CORE
a) Compounds
b) Flour
c) Paste
d) Oil
e) Wax-vent wire

CUTTING COMPOUNDS

FIREBRICKS AND CLAY — for foundry

FIRE HANDLES — assorted sizes

GRAPHITE — for foundry

IRON — pig, for foundry

LACQUER — transparent and colored, for finishing

NUTS — S.A.A., acorn cap, castellated, square, hexagon, joint, and wing, selected sizes and kinds

OIL
a) Boiled linseed
b) Lubricating
c) Quenching and hardening

PACKING
Round, sheet, square, or tubular

PAINT — black asphaltum

PINS
a) Cotter, 5/32-in. to 1/4-in. diam. from 1/2 in. to 2 in. long
b) Flask, for flask repairs
c) Taper, Nos. 0 to 6, 1/4 in. to 2 in. long

PUMICE POWDER

RIVETS
a) Copper, with burrs, Nos. 7 to 14, lengths, 1/8 in. to 3/4 in., selected sizes
b) Iron, No. 14 gauge to 3/16 in., flathead or button head, 1/4 in. to 1 in. long, selected sizes
c) Tinners', flathead, 8 oz. to 16 lb., either tinned or black, selected sizes

SAND
a) Molding, in 350-lb. barrels or 800-lb. casks
b) Parting, in 350-lb. barrels or 800-lb. casks

SCREWS
a) Flathead or roundhead iron brass, selected sizes and kinds
b) Cap and machine, iron or brass, selected sizes and kinds
c) Set, head and headless

SOLDER — acid or rosin core; bar, or solid wire

SOLDERING PASTE OR SALTS

STEEL
a) Bessemer, rod, 1/64 in. to 3/8 in. by 64ths, in 4-ft. lengths, selected sizes
b) Bars, cold rolled, 1/8 in. to 3/8 in. thick, 1/2 in. to 2 in. wide, 12-ft. lengths, selected sizes
c) Drill rod, letter sizes, A to Z, number sizes, 1 to 80, in 3-ft. lengths, selected sizes
d) Rods, hexagon and square, cold rolled, 1/4 in. to 3/4 in., in 12-ft. lengths, selected sizes
e) Round, cold rolled, diameters 1/8 in. to 1 in., lengths 12 ft., selected sizes
f) Sheet, black, Nos. 18, 20, 22, 24, 26, 28, U. S. gauge; size of sheets, 24 in., 28 in., and 30 by 96 in.
g) Sheet, galvanized, Nos. 18, 20, 22, 24, 26, 27, and 28 U. S. gauge; size of sheets, 24 in., 28 in., and 30 by 96 in., selected sizes
h) Threaded rods, Nos. 6 to 10, in 12-in. lengths, Nos. 12, 14, 1/4 in., and 5/16 in., in 24-in. lengths, selected sizes

TIN
a) Pigs, for casting alloys
b) 1C, 1X, 20 by 48 in.
c) 1XX, 20 by 48 in.

WASHERS AND BURRS
a) Copper burrs, Nos. 3 to 14, in 1-lb. boxes
b) Iron burrs, Nos. 3 to 14, in 1-lb. boxes
c) Brass washers, 3/16 in. to 1/2 in. by 16ths
d) Iron washers, 3/16 in. to 1/2 in. by 16ths

WELDING FLUXES

WELDING RODS (all rods come in 24-in. lengths)
a) Brazing, 1/16-in., 1/8-in., and 3/16-in. diameter
b) Cast aluminum, 3/16-in., 1/4-in., and 3/8-in. diameter
c) Cast brass, 3/16-in., and 3/8-in. diameter
d) Cast bronze, 1/4-in. diameter
e) Cast copper, 3/16-in. and 1/4-in. diameter
f) Cast iron, 3/16-in., 1/4-in., 5/16-in., and 3/8-in. diameter
g) Low carbon steel, 1/8-in., 3/16-in., and 1/4-in. diameter

WHITE LEAD — for machine shop

WIRE
a) Annealed, 16 to 34 W and M gauge, selected sizes
b) Coppered market, 5 to 18 W and M gauge, selected sizes
c) Coppered spring, 2 to 18 W and M gauge, selected sizes
d) Galvanized, 5 to 18 W and M gauge, selected sizes
e) Piano, Nos. 2/0 to 36, selected sizes
f) Tinned, 16 to 24 W and M gauge, selected sizes
g) Wool, Nos. 0 to 3 in 1-lb. packages, selected sizes

ZINC
a) Pigs, for casting alloys
b) Sheet, Nos. 4 to 14, sheets 36 in. by 84 in.

Sparky Sez

May I start by introducing myself? As you can see from the title, they call me Sparky. I'm what you might call a trade character and I serve as official spokesman for Marquette products.

Right now there's a tremendously important job to be done. You people in the schools and training shops have the responsibility of training large numbers of skilled, efficient workers for industry. The Marquette people have the responsibility of providing the most up-to-date equipment and materials, both for training purposes and for maintaining industrial production.

When it comes to developing welding skill, modern equipment is as indispensable as competent instruction. Only equipment that has kept pace with the many advances in welding technology can prepare the trainee to meet today's high standards of workmanship. It is such equipment—outstanding in modern simplicity and efficiency — that Marquette places at your disposal.

Marquette AC Instant Arc Welders are a triumph in modern engineering. The last word in design, construction and performance, they will weld any metal that can be welded. They are easy to use, positive in arc action — **silent**, stable, full of power.

Marquette Oxy - Acetylene welding and cutting outfits, equally outstanding and up-to-the-minute in the field of gas welding, come in a number of sizes and combinations to meet all requirements, including aircraft cutting and welding.

Throughout the complete Marquette line of welders, electrodes and accessories, is found the same high level of quality that has earned Marquette its international reputation. The same know-how that has created the Marquette line is available to you in field service if you would like help on a personal or shop welding problem. Use the coupon as your first get-acquainted step. Liberal educational discounts.

A. C. WELDERS AND ACCESSORIES

MARQUETTE GAS-PAK . . . GAS RODS

MARQUETTE ROD HOD

TRAIN Them on Modern Equipment

OXY-ACETYLENE WELDING AND CUTTING OUTFITS

MARQUETTE FLUX

ARC WELDING ELECTRODES

MARQUETTE

REGISTERED U.S. PAT. OFFICE

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Utility Model. External. ¼ hp. Wheel capacity 4". For lathes with 9" to 13" swing $67.50

Your industrial distributor will gladly demonstrate the quality line of Dumore precision Tool Post Grinders. See him today, or write

The DUMORE Company
1329 Seventeenth St.
RACINE • WISCONSIN

COURSE OUTLINE FOR SERVICE STATION ATTENDANTS

(Continued from page 49A)

nection with *service station attendant work* in which you will be instructed as an introduction to auto mechanics.

There are three places for check marks opposite each item in the outline. Your instructor will place a check in the *Instructed* column opposite a concept, experiment, or job when it has been thoroughly explained to you, and you are able to do that particular job well but slowly. You will be required to master the knowledge of materials, the trade terms and other requirements pertaining to a job before the instructor will place a check in the first column.

Since the speed at which you do a job is developed through repetition, you will be required to do each kind of work many times. When you can do a certain kind of work with the speed expected of an apprentice, your instructor will check the column headed *Apprentice Proficiency.*

As you gain skill and speed through additional experience, you will attain the proficiency of an advanced apprentice. When you have reached this stage, your instructor will check the column headed, *Advanced Apprentice Proficiency.* This rating will indicate that you have reached the proficiency expected of a graduate apprentice.

Copies of this progress record will be kept by the instructor while you are learning this work and will be available from your instructor at any time. On the completion of the progress record it will be filed as a permanent record and you will be entitled to a certificate attesting to ability.

Outline and Progress Record for Service Station Attendant

Adv. Appren. Proficiency .....
Apprentice Proficiency .....
Instructed .....
Time .....

ORDER OF SERVICE:
1. Windshield sales and service
2. Gasoline sales and service
3. Under-hood inspection and sales
4. Motor-oil sales and service
5. Radiator sales and service
6. Battery sales and service
7. Settlement of purchase
8. Practice work

TIRE SERVICE:
1. Air standard sales and service
2. Dismount car tires and tubes
3. Repair tire tubes (Cold patch, hot patch)
4. Mount car tires and tubes
5. Remove and mount wheels
6. Operate hydraulic jack
7. Chains: Put on and remove
   Repairs: regular and emergency
8. Practice work (tire service)

STATION MAINTENANCE:
1. Clean driveway
2. Clean pump island
3. Clean rest room

ATTENDANT'S ROUTINE FOR GASOLINE SALES:
1. Approach
2. Pumping gasoline
3. Windshield and rear window
4. Oil check
5. Radiator check
6. Extra sales possibilities

LUBRICATION:
1. Fill lube guns
2. Operate hydraulic lift
3. Lubricate chassis (high pressure gun)
4. Change and flush crankcase
5. Drain and flush transmission
6. Drain and flush differential
7. Lubricate covered springs
8. Inspect and fill master brake cylinder
9. Under-hood lubrication
10. Service air cleaner (wire gauge and oil bath type)

INSTALLATION AND SERVICE:
1. Remove and install batteries
2. Install battery cradles and hold-downs
3. Install battery cables
4. Charge batteries
5. Replace fan belts
6. Remove and clean spark plugs
7. Install spark plugs
8. Install windshield wiper arms and blades
9. Replace radiator hose
10. Replace oil filter (sealed cartridge and element type)
11. Replace lamp bulb

YOU AND YOUR FUTURE JOB

ISADORE M. FENN
Chicago Vocational School
and
ALBERT E. FENN
Taft High School
Chicago, Ill.

Selecting a Lifework Which Fits You

Your selection of a life occupation is, without doubt, your most important personal problem. You can select a useful or a useless future. In determining what your future is to be, you must have a plan. Today, more than ever before, you must be conscious of the fact that you possess certain characteristics and qualifications which make you better suited to a definite occupation than to certain other occupations. You should be interested in

(Continued on page 49A)

BOYAR-SCHULTZ

Tool Room Grinders

Boyar-Schultz Grinders for the tool room and die shop have won a most enviable reputation for accuracy where accuracy counts most. They are dependable . . . the favorite machine tools with skilled mechanics who KNOW how a fine tool must perform.

These tool room grinders have the design, the fine quality materials, and the unexcelled workmanship that make them the best your tool dollar can buy.

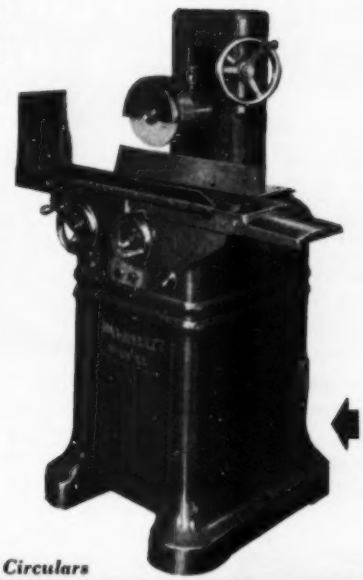
No. 6-12 SURFACE GRINDER

A precision Machine Tool built to provide the close tolerance performance that has long been associated only with larger and more costly grinders. Users tell us that it produces flatness, horizontal and vertical tolerance comparable with any other grinder regardless of size.

The new Boyar-Schultz Dust Collector Unit is furnished as optional Equipment. It is built into a new streamlined stand which replaces the stand furnished as regular equipment. No additional floor space is required with Dust Collector Unit.

No. 1 PROFILE GRINDER

A fast operating precision Machine Tool for saving time in grinding odd and irregularly shaped surfaces; fitting dies and punches and other time consuming grinding jobs.



No. 2 PROFILE GRINDER

A Profile Grinder for larger and heavier work. Made in two styles—Single or Dual Spindle. Designed for such heavy work as aircraft, automotive and locomotive building, and other heavy profile grinding.

No. 6-18 SURFACE GRINDER

An extremely accurate Grinder for tool room work and gage grinding, as well as production. Rugged construction and superior engineering assure accuracy over a long period of usefulness.

Write for Circulars

BOYAR-SCHULTZ CORPORATION

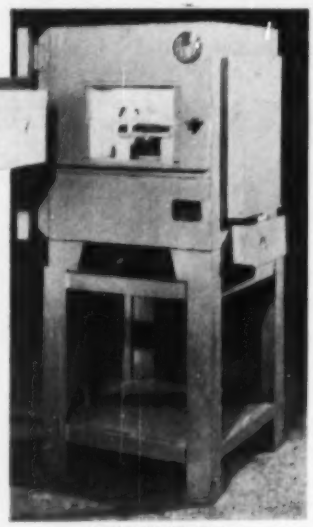
Walnut Street • Chicago 12, Illinois

A Message to Ceramic Teachers

INSIST ON RUGGED, DEPENDABLE

Harper

KILNS FOR SCHOOL PRODUCTION FIRING



Model SK-999-HD

Shown above is one of several sturdy Harper Electric Studio Kilns, built to withstand heavy school ceramic firing.

They fire all types of ware easily and safely up to 2500° F (Cone 13) and do not require constant maintenance.

A Harper Studio Kiln in your ceramic department will save valuable time and expense caused by kiln breakdowns.

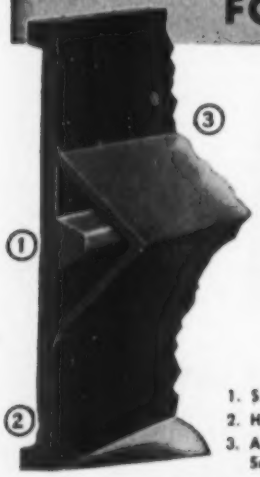
Harper Studio Kilns are available in sizes from ½ — 15 cubic feet capacity for operation to 2100° F and 2500° F.

WRITE TODAY FOR BULLETIN 1246

HARPER ELECTRIC FURNACE CORPORATION

DEPT. 3 • 39 RIVER STREET • BUFFALO 2, N. Y.

STERLING is the *Original* and *Only* ROLLED STEEL CHANNEL FOUNDRY FLASK

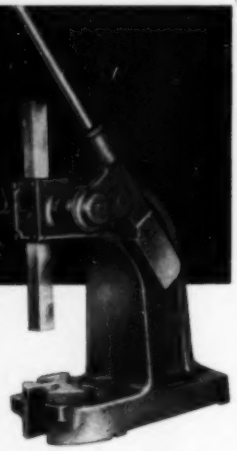


When you specify Sterling Flasks, you get the very best that money can buy. For Sterlings are backed by almost a half-century of "know-how" in fabricating precision-built foundry flasks. Sterling pioneered and perfected the famous ROLLED STEEL CHANNEL construction, long proven superior under rough foundry usage. That's why, today, you will find Sterlings in more than 4500 foundries. Write for Catalog No. 60 describing the complete line of Sterling Foundry Equipment.

STERLING WHEELBARROW COMPANY
Milwaukee 14, Wis., U.S.A.

1. Solid Rolled Reinforcing Rib
2. Heavy Square Flanges with Full-Width Bearing
3. Angle Reinforcement Welded Around Flask Section

Economical **ARBOR PRESSES** FOR SCHOOL SHOPS



An ideal press for school shops requiring pressures up to 3 tons. Just the right size to handle practically all work usually found in these shops. Also widely used in all kinds of industry.

HAND WHEEL — Advances the ram to the work quickly and easily.

ADJUSTABLE HANDLE — Position is adjustable with a ratchet.

COUNTERWEIGHT — Keeps handle in uppermost normal position.

AUTOMATIC BRAKE — Automatic pressure brake holds ram in any position.

MACHINED TABLE — Large surface provides accurate work support.

SQUARE RAM — Heat-treated ram with large bearing surfaces and shimmed cap to provide long wear.

For more detailed information on this and other size presses, write for the illustrated Dake Arbor Press Catalog.

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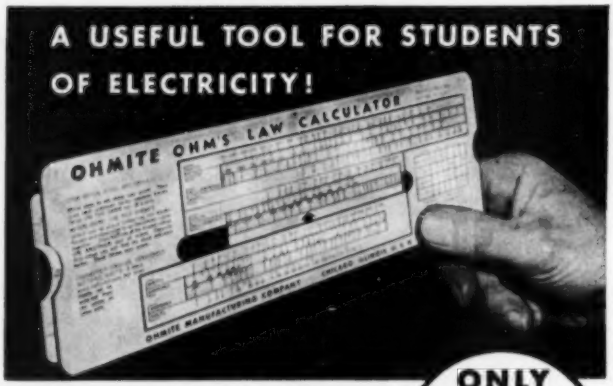
OHM'S LAW CALCULATOR AND SLIDE RULE

A USEFUL TOOL FOR STUDENTS OF ELECTRICITY!



ONLY 25¢ TEACHERS! ONLY 15¢ each in quantities of 25 or more

A time-saving calculator for your students after they have learned Ohm's Law. Solves Ohm's Law and many parallel resistance problems simply, quickly, accurately—with only one setting. Slide rule scales multiply, divide, find squares, square roots, etc. Only 9" x 3", heavy varnished cardboard, it fits handily into the pocket. Also available in durable vinylite at $1.50.

OHMITE MANUFACTURING CO. • 4993 Flournoy St., Chicago 44, Ill.

YOU AND YOUR FUTURE JOB

(Continued from page 46A)

discovering a lifework which is suitable to yourself and in which you will experience the greatest amount of success and happiness.

The most difficult task in the world for one who hopes to succeed — is selecting the exact nature of work for which one's abilities are best suited — thus avoiding the problem of "the round peg in the square hole."

Many individuals are not finding real joy in living for the sole reason that they are not fitted for the work which they are doing. They did not investigate and study all available information about various occupations. They did not take the time to consider what occupation they were best adapted for and then prepare for it. They did not make certain that they were well grounded in the basic tool subjects: reading, writing, and mathematics. Finally, they made a very costly mistake by utterly ignoring the question of whether they had qualifications for success in the field of work which they undertook.

Important Suggestions — Steps Toward Success

If you hope to establish yourself in the field of work which you like to do day in and day out, you must definitely ascertain, through investigations, testing services, the abilities, aptitudes, and personality needed for success in that particular lifework. Your selection of a vocation *must not be based solely upon your desire to that kind of work*. You must make an honest and intelligent analysis of your capabilities, qualities, likes and dislikes, and compare them with the requirements of desirable occupations. This process of self-discovery involves collecting, itemizing, reviewing, evaluating, discarding, and accepting evidence about yourself, such as the following:

1. Personnel tests (administered in school or at personnel testing service laboratories)
2. Work you can do well
3. Present occupational interests for which you think you have the qualifications
4. Personal qualities, such as: accuracy, industry, imagination, honesty, adaptability, capacity for straight thinking, etc.
5. School subjects you like
6. Social and recreational interests

Occupations should be thoroughly investigated, and carefully compared by considering the following detailed information about them:

a) What are the actual duties?
  1) Hours of work?
  2) Security, tenure?
  3) Is it year round?
  4) Salary, beginning — increases?
b) Is the occupation important to society?
c) Is there a chance for promotion?
d) Education and preparation necessary for entrance to the occupation?
e) Is there a demand for this occupation — future trends?
f) What are the advantages and disadvantages?
g) My fitness for this occupation: mental and physical?
h) Do my experiences show that I might be fitted for this type of work?
i) Would experience in this work fit me to change to another occupation if a change were advisable?

(Continued on page 52A)

TRAIN THEM WITH LUFKIN

Free—A WIDE SELECTION OF PROVEN TEACHING AIDS TO HELP YOU!

The Lufkin Rule Company will supply booklets and other teaching aids, free of charge, in quantities sufficient for your classes. Mail the coupon below and samples of these items will be sent to you, along with descriptions of various wall charts that are available.

Remember—use Lufkin tools today to train your students and you train them with the tools they will use on the job tomorrow.

BUY LUFKIN TAPES • RULES • PRECISION TOOLS FROM YOUR INDUSTRIAL DISTRIBUTOR

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THE LUFKIN RULE CO., DEPT. IA, SAGINAW, MICHIGAN
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Save time training operators... help train supervisory personnel ... improve vocational school machine shop courses

These are some of the schools using Kearney & Trecker milling machines for their vocational training:

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University of Alabama — Alabama

ALASKA
University of Alaska — Fairbanks

ARKANSAS
N. Y. A. of Arkansas — Marrilton

CALIFORNIA
California Institute of Technology — Pasadena
Chaffey Junior College — Ontario
City College of San Francisco — San Francisco
Cogswell School — San Francisco
Downey Union High School — Downey
Galileo Hi School — San Francisco
Jefferson Union High School — Daly City
New Port Harbor Union High School — New Port Beach
San Bernardino Valley College — San Bernardino
Santa Monica Technical School — Santa Monica
Senior High School — Burbank
Board of Education — San Francisco
Stanford Research Institute — Menlo Park
State Board of Education — Burbank
California Polytechnic School — San Luis Obispo
University of California — Los Angeles
Ventura Junior College — Ventura
Alhambra City School District — Alhambra
University of California — Berkeley
Compton Union High School — Compton
University of California — Davis
Fullerton Union High School — Fullerton
Whittier Union High School — Los Angeles
Board of Education — San Francisco
Santa Ana High School — Santa Ana

COLORADO
Colorado A & M College — Ft. Collins
Lillie Vocational School — Colorado Springs
Pueblo Junior College — Pueblo
Opportunity School — Denver
University of Denver — Denver
School District No. 20 — Pueblo

CONNECTICUT
Columbia University — New London
Manchester Trade School — Manchester
New Haven Defense Training Center No. 1 — New Haven
State Trade School — Hartford
State Trade School — Torrington
Waterbury Defense Training Center No. 1 — Waterbury
State Trade School — Stamford

GEORGIA
Georgia School of Technology — Atlanta
Vocational School — Macon
Georgia Training School for Boys — Milledgeville

ILLINOIS
Austin High School — Chicago
East High School — Rockford
Argonne National Laboratory — Chicago
Chicago Vocational School — Chicago
Community High School — Dupo
Danville High School — Danville
Illinois Institute of Technology — Chicago
Lockport Township High School — Lockport
Macomb High School — Macomb
Madison Street Training School — Chicago
Main Township High School — Des Plaines
James Millikan University — Decatur
National Defense Training School — Rock Island
Board of Education — Rockford
J. Sterling Morton High School & Jr. College — Cicero
Thornton Township High School & Jr. College — Harvey
Woodstock High School — Woodstock
University of Chicago — Chicago
Englewood High School — Chicago
Washburne Apprentice School — Chicago
Joliet Township High School — Joliet
Moline Board of Education — Moline
Bradley Polytechnic Institute — Peoria
Rockford Senior High School — Rockford
Sterling Township High School — Sterling
University of Illinois — Urbana

INDIANA
Anderson Public Schools — Anderson
Beech Grove High School — Beech Grove
Board of Education — Columbus
Board of Education — East Chicago
School City of Gary — Gary
Griffith High School — Griffith
Lawrenceburgh Consolidated High School — Lawrenceburgh
Manual Training High School — Indianapolis
Mechanic Arts School — Evansville
University of Notre Dame — Notre Dame
Peru High School — Peru
Technical Vocational School — Hammond
Vocational Education Dept. — South Bend
School City of Whiting — Whiting
Alexander Junior-Senior High School — Alexandria
Arsenal Technical High School — Indianapolis
Purdue University — Lafayette
Gestmeyer Technical High School — Terre Haute
Indiana State Normal — Terre Haute

IOWA
The State University of Iowa — Iowa City
Iowa State College — Ames

KANSAS
Board of Education — Wichita
Labette County Community High School — Altamont
Kansas State Agricultural College — Manhattan
Topeka Public Schools — Topeka
Wichita High School — Wichita

KENTUCKY
Titchman Trade School — Paducah
Theo. Ahrens Trade School — Louisville

LOUISIANA
Orleans Parish School Board — New Orleans
Sullivan Memorial Trade School — Bogalusa
Booker T. Washington High School — New Orleans

MASSACHUSETTS
Boston Teachers College — Boston
Mechanical Arts High School — Boston
Worchester Boys' Trade School — Worchester
Board of Education — Wyandotte
Beverly High School — Beverly
Brookline Manual Training — Brookline
Mass. Institute of Technology — Cambridge
East Boston High School — East Boston
Holyoke High School — Holyoke
Hyde Park High School — Hyde Park
Lawrence Industrial School — Lawrence
Medford Vocational School — Medford
Vocational School — New Bedford

MICHIGAN
Edison Institute of Technology — Dearborn
Great Lakes College — Detroit
Ishpeming Public Schools — Ishpeming
Lawrence Institute of Technology — Highland Park
Michigan College of Mining & Technology — Sault Ste. Marie
National Defense Training Program — Detroit
State Board of Control for Vocational Education — Berkley Crow
Board of Education — Grand Rapids
Vocational School — Battle Creek
Washington High School — Detroit
Wilbur Wright High School — Detroit
University of Michigan — Ann Arbor
Dearborn High School — Dearborn
Fordson School — Dearborn
Lowrie Jr. High School — Dearborn
Salena Jr. High School — East Dearborn
Cass Technical High School — Detroit
Chadsey High School — Detroit
Bishop School — Detroit
Edwin Denby High School — Detroit
Wright School — Detroit
Redford High School — Detroit
G-M Institute of Technology — Flint
Copernicus Jr. High School — Hamtramck
Hamtramck Vocational School — Hamtramck
Jackson High School — Jackson
Central High School — Kalamazoo
Western State Teachers College — Kalamazoo
Boys Vocational School — Lansing
Michigan State College — East Lansing
Wilson School — Muskegon

MINNESOTA
Miller Vocational School — Minneapolis
St. Paul Vocational School — St. Paul
University of Minnesota — St. Paul
School District No. 12 — Ely

MISSOURI
Missouri School of Mines & Metallurgy — Rolla
Washington University — St. Louis
Manual High & Vocational High — Kansas City
Cleveland High School — St. Louis

NEW HAMPSHIRE
New Hampshire College of Agriculture — Durham

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Rutgers University – New Brunswick

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University of California – Los Alamos
University of California – Albuquerque

NEW YORK
Baron De Hirsch Trade School – New York
Batavia Metal Trades Vocational School – Genesee County
East New York Vocational High School – New York
Manhattan College – New York
New York Trade School – New York
Olean Public Schools – Olean
Sewhanaka High School – Floral Park
Sewhanaka High School Board of Education – Nassau County
State Agricultural & Industrial School – Industry
Board of Education — Vocational School – Kingston
Vocational High School – New York
West High School – Auburn
New Technical High School – Auburn
Union Free School District – Batavia
North Senior High School – Binghamton
Peckham Vocational School – Buffalo
McKinley Vocational School – Buffalo
Vocational School No. 10 – Dunkirk
Board of Education – Hastings-on-Hudson
State Agricultural School – Industry
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Newton High School – Long Island City
Masena High School – Masena
Textile High School – New York
Queens College – New York
Bronx Vocational School – New York
Franklin K. Lane High School – New York
Geo. Hall Trade School – Ogdensburg
University of Rochester – Rochester
Rochester Shop School – Rochester
Saranac Lake Public School – Saranac Lake
Staten Island Vocational School – Staten Island
Continuation School – Syracuse

NORTH CAROLINA
North Carolina State College of Agriculture & Engineering Research – Raleigh
University of North Carolina – Chapel Hill
Duke University – Durham

OHIO
Industrial Arts School – Barberton
Case Institute – Cleveland
Delaware Board of Education – Delaware
Fenn College – Cleveland
Harding High School Vocational Shop – Akron
Ohio State University – Columbus
The Parker Vocational School – Dayton
Portsmouth City School – Portsmouth
Western Reserve University – Cleveland
Timken Foundation of Canton – Canton
East Technical High School – Cleveland
Collinwood High School – Cleveland
Case School of Applied Science – Cleveland
Washington High School – Massillon
Toledo Vocational School – Toledo
Woodward High School – Toledo
Waite High School – Toledo

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Oklahoma Agriculture & Mechanical College – Stillwater
Oklahoma City Trade School – Oklahoma City
University of Oklahoma – Norman
Board of Education – Ponca City
Daniel Webster High School – Tulsa
New High School – Tulsa
Benson Polytechnic School – Portland
Multnomah County – Portland
Jefferson High School – Portland

PENNSYLVANIA
Arnold Public School – New Kensington
Berwick School District – Philadelphia
Board of Directors – Williamsport
Duquesne Vocational School – Duquesne
Lansdale Vocational School – Lansdale
Munhall Vocational School – Munhall
North Braddock Public School – Allegheny City
Quakerstown High School – Quakerstown
School District of the City of New York – Homestead
Schwab Vocational School – Pittsburgh
South Philadelphia Boys' High School – Philadelphia
Atreus Wanner Vocational School – York
York School Board – York
Allentown High School – Allentown
Lower Merion High School – Ardmore
Bethlehem Trade School – Bethlehem
Liberty High School – Bethlehem
State Teachers College – California
Vocational Machine Shop – Clairton
Erie East Technical High School – Erie
Ridley Township High School – Folsom
Franklin High School – Franklin
McCaskey High School – Lancaster
New Castle Trade School – New Castle
New Kensington High School – New Kensington
Arnold Public School – New Kensington
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Girard College – Philadelphia
Hill School – Pottstown
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Pennsylvania State College – State College
G. A. R. High School – Wilkes-Barre
E. L. Meyers High School – Wilkes-Barre
Wilmerding School District – Wilmerding

PUERTO RICO
University of Puerto Rico – Rio Piedras

RHODE ISLAND
The Pennsylvania State College – Newport

TENNESSEE
Crocket Technical High School – Memphis

TEXAS
Arlington State College – Arlington

UTAH
Bingham High School – Bingham
Central Utah Vocational School – Provo
Educational Institution Carbon College – Price
Jordan School District – Sandy
Ogden High School – Ogden
Tooele High School – Tooele
West High School – Salt Lake City

VIRGINIA
John Marshall High School – Richmond

WEST VIRGINIA
Stonewall Jackson High School – Charleston
Huntington High School – Huntington
West Virginia University – Morgantown
McKinley Vocational High School – Wheeling
Weston Trade School – Weston

WASHINGTON
Bremerton Vocational School – Bremerton
Defense Training School – Longview
Seattle School District – Seattle
North Kipsap School – Paulsbo
State College of Washington – Pullman
Tacoma Vocational School – Tacoma
University of Washington – Seattle
Board of Vocational Education – Vancouver
Seattle-Edison Vocational School – Seattle

WISCONSIN
Central High School – West Allis
Fond du Lac Vocational School – Fond du Lac
La Crosse Vocational School – La Crosse
Marinette Vocational School – Marinette
Milwaukee School of Trades – Milwaukee
Oshkosh Vocational School – Oshkosh
Vocational School – Wisconsin Rapids
The University of Wisconsin – Madison
Beloit Vocational School – Beloit
Fond du Lac Public Schools – Fond du Lac
Green Bay Vocational School – Green Bay
Kaukauna Vocational School – Kaukauna
Kenosha Vocational School – Kenosha
West High School – Madison
Madison Vocational School – Madison
Boys Technical High School – Milwaukee
Milwaukee Vocational School – Milwaukee
Neenah Senior High School – Neenah
Sheboygan Vocational School – Sheboygan
Two Rivers School of Vocational & Adult Education – Two Rivers
Wausau Vocational School – Wausau
West Allis Vocational School – West Allis
Wisconsin Rapids Public Schools – Wisconsin Rapids

CANADA
H. S. Beal Technical & Commercial High School – London
Toronto Board of Education – Toronto
W. D. Lowe Vocational School – Windsor
Central Technical School – Toronto
Windsor-Walkerville Technical School – Windsor
Quebec Technical School – Quebec
Canada Vocational Training School – Saskatchewan

YOU AND YOUR FUTURE JOB

(Continued from page 49A)

j) What are the opportunities for vacation and recreation?

Sources of Information About Occupations

1. Reading books and pamphlets about occupations.

2. Interviewing authorities in the respective fields of work.

3. Observing and speaking with workers in the greatest variety of occupations.

4. Visual aids about occupations.

Thousands of different ways of earning in our great industrial world may be divided into eleven fields of work. The occupation of every individual may be classified in one or more of these divisions of industry. These occupations are necessary in our social order for the purpose of providing human needs such as food, clothing, shelter, and recreation.

A step in the right direction — to become a productive citizen — is to make a choice of a general field of work and then select a specific occupation.

Fields of Work and Sample Occupations

1. *Agriculture* (work of the land, feeding people): cotton and tobacco planter, dairy farmer, fisherman, forest ranger, fruit grower, lumberman, nurseryman, poultry farmer, ranchman, stock raiser.

2. *Commerce* (merchandising, credit and banking): accountant, advertising expert, banker, broker, buyer, cashier, legal adviser, realtor, salesman, statistician.

3. *Communication* (work dealing with telephone, telegraph, wireless, and radio): broadcaster, lineman, radarman, radio technician, switchboard operator, telegrapher, telephone operator, wireless operator.

4. *Construction* (building with various materials): aircraft worker, architect, automobile worker, blueprint reader, boilermaker, carpenter, contractor, draftsman, electrician, engineer, machinist, metalsmith, plumber, shipbuilder.

5. *Manufacturing* (work in industries and factories): baker, butcher, cabinetmaker, cook, decorator, designer, engineer, engraver, garment worker, machine operator, patternmaker, printer.

6. *Mining* (work with minerals and oils): chemist, engineer, miner, oil well operator, quarryman, safety inspector, surveyor.

7. *Personal and domestic service* (serving the people, private employment): barber, bookkeeper, butler, chauffeur, cosmetician, governess, grocer, maid, manicurist, messenger, model, nurse, photographer, porter, secretary, waiter.

8. *Professional service* (specialized work, requiring a superior education): clergyman, dentist, lawyer, nurse, oculist, orthodontist, pharmacist, physician, surgeon, teacher, veterinary.

9. *Public service* (serving the people, elected officials, civil service, and private employment): assessor, auditor, clerk, correspondent, fireman, judge, librarian, mailman, mayor, policeman, postal clerk, publisher, reporter, teacher, treasurer, weather observer.

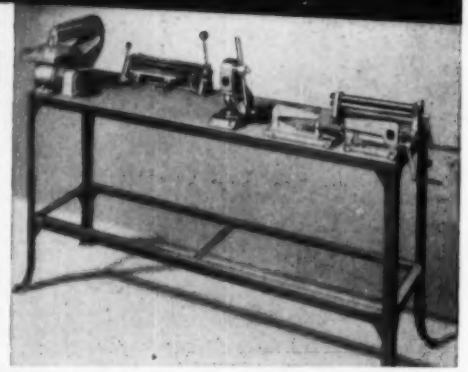
10. *Recreation* (entertainment): actor, athletic director, cartoonist, motion picture machine operator, musician, orchestra director, playground director, scenario writer, story writer, stage manager, theater manager.

(Continued on page 56A)

BERKROY TOOLS FOR THORO SHEET METAL TRAINING

SHOP On-A-Bench

A complete 5-tool sheet metal shop in one compact unit. All tools handle sheet steel up to 20-gauge. All operate like larger, industrial shop tools.



TOOL STAND — Heavy gauge steel. 18" x 68" x 35".

12" BRAKE — Bends sheets and makes simple metal trim.

NIBBLER-SLITTER — 12" throat capacity. Cuts odd shapes. Does straight or scroll work.

SHEAR and CLAMPING HEAD ACCESSORY — For trimming, strip cutting, outside circle and contour cutting.

HAND PUNCH — For use with dies, punches and cutting blades for punching, press fits, notches, corner cuts, etc.

12" SLIP ROLL — Forms cylinders, reverse curves, scrolls, etc.

FOR LARGER WORK, WIDER VERSATILITY—24" RING AND CIRCLE SHEAR

The only tool of its type with the *Micro Feed Handle* for adjustment of circle diameters. Cuts rings and circles up to 24" diameter from square stock. Handles a wide variety of trimming operations, strip cutting and contour cutting on sheet metal up to 20 gauge. Cutters are hardened, tempered tool steel. 32" x 7" bed length, 12" x 4½" shear, and 21" x 3¾" clamping head assure capacity for a wide variety of projects, of industrial size. Accurately machined, enclosed gears and rugged construction assure sustained accuracy under constant school shop use.

BERKROY 24" BOX AND PAN BRAKE

With Positive stop at any angle from 0° to 135°

Makes intricate folds, reverse bends and radius bends on sheet steel up to 16 gauge and up to 24" wide. The accuracy, ease and speed of its operation result from features found in no other brake. Bending leaf operates on Torrington Needle Bearings. Full 1" clearance between top fingers and anvil. Maximum 2½" box or pan depth permits deeper bends. Turning a knob provides infinite adjustment to any angle from 0° to 135°. Forms any size box or pan from ½" to 24" by ¼" graduations.

For catalog information, write to

BERKROY PRODUCTS, Inc.

2512 N. ONTARIO STREET • BURBANK, CALIFORNIA

Write for FREE SCHOOL SHOP PATTERN PROJECT

EASY FAST

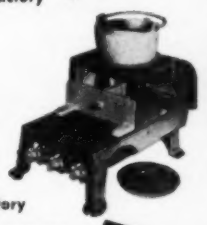
TEACH HEAT TREATING
The Modern Way
with Quick Acting JOHNSON Furnaces

No. 101 Bench Furnace

Delivers up to 1800° F. without a blower. Powerful, efficient and economical. For heating soldering coppers up to 12 lbs. per pair. Ideal for heat treating, case hardening, and annealing carbon steels. Two burners. Firebox 3¾x4½x5½. Complete with work rest block and baffle plate.

$18.80 F.O.B. Factory

No. 118 Combination Furnace



Use this furnace for heat treating carbon steels and for melting soft metals such as lead, tin, zinc, babbitt, etc. Lid on hood may be removed and 22 lb. melting pot inserted. Firebox 6¼x5x6½. Complete with pot as illustrated.

$35.00 F.O.B Factory

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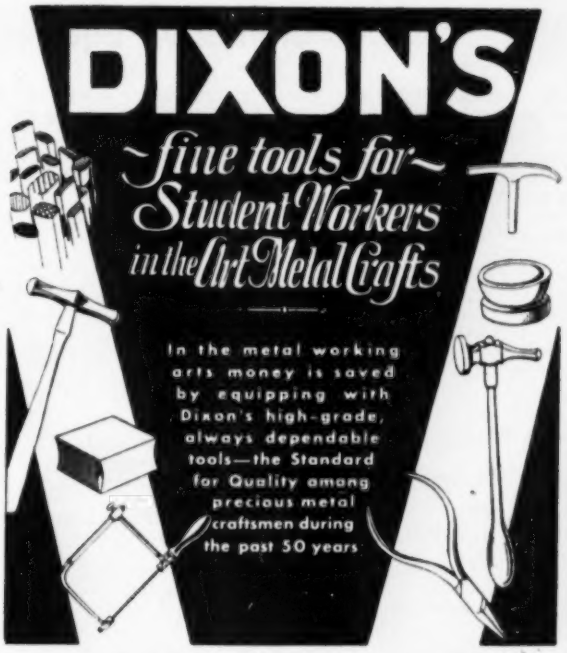
DIXON'S

fine tools for Student Workers in the Art Metal Crafts



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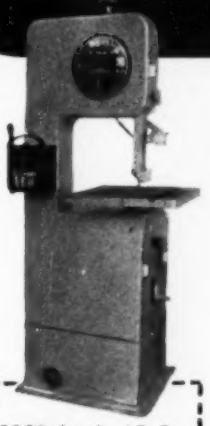

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BETTER for the School Shop Budget
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Because of its construction features and responsive control of variable tool speed in both high and iow range, the Utility DoALL is capable of turning out school shop projects to the most exacting standards of workmanship and accuracy.

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8-14

Automotive Equipment, Tools, and Supplies

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

AIR COMPRESSOR
- a) 3 to 4 cu. ft., with tank, piping, and motor
- b) Small portable, 1 cu. ft., with motor

ALIGNING JIG — for connecting rods

ANVIL
- a) No. 100 or No. 125
- b) Rim

ARMATURE GROWLER AND TESTER

AXLE STANDS

BATTERY EQUIPMENT
- a) Cell tester, panel type with discharge rack
- b) Charger (15-battery size) with rack
- c) Charger (6-battery size)
- d) Gas stove (small)
- e) Lead-burning torches, with gauges and piping
- f) Plate racks

BENCH
- a) Electric test, elaborate
- b) Electric test, simple
- c) Work, with vises
- d) Work, portable with vise

BLACKBOARD

BLOWTORCHES — 1-qt. size

BOOKCASE

BRAKE
- a) Adjusting stand
- b) Band-lining machine

BULLETIN BOARD

CABINETS
- a) Wood or metal, for bolts and supplies
- b) Wood or metal, for filing job sheets and correspondence

CHAIN HOIST — with overhead trolley and track

CHAIRS
- a) Teacher's
- b) For tables, or with tablet arms

CRANE — portable

CRANKSHAFT TRUING TOOL

CREEPERS

DESK — teacher's

DRILL
- a) Breast
- b) Hand
- c) Electric portable, ½ in.
- d) Electric portable, ¼ in.
- e) Press, 21 in., with motor and chuck

DYNAMOMETER — electric

FORGE — with blower and tools

FURNACES — gas

GREASE DISPENSERS

GRINDER
- a) Cylinder, with motor
- b) 8 in., with motor
- c) 12 in., with motor

HONES — cylinder

JACKS
- a) Lever, 1½-ton
- b) Floor, roller

LATHE
- a) 11 in. by 4 ft., with motor, chucks, and attachments
- b) 16 in. by 6 ft., with motor, chucks, and attachments

PRESS
- a) Arbor
- b) 30 ton

SPRAY PAINTING OUTFIT

VALVE REFACING MACHINE

VULCANIZER
- a) Electric steam for tube work
- b) Small, hand

WELDING OUTFIT — with tanks, gauges, and cutting torch

WHEEL ALIGNMENT
- a) Gauge
- b) Test table

Automotive Shop — Small Tools

ABRASIVE — rubstone for cleaning castings in foundry

ALCOHOL TESTER

BATTERY
- a) Cell tester, prod type
- b) Cell tester, cadmium
- c) Clips, large
- d) Element pullers
- e) Fillers
- f) Funnels, glass
- g) Hydrometer, acid
- h) Knives
- j) Post builders
- k) Post drills
- l) Post markers
- m) Separator trimmer

BITS
- a) Expansive
- b) Ratchet brace
- c) Wood, 5/16 in. to 1 in.

BOLT CUTTER — 24 in. and 36 in.

CALIPERS — 6 in. inside and outside

CANS
- a) Oil, ½ pt.
- b) 1 gal., gas, safety
- c) 5 gal., gas, safety
- d) 5 gal., kerosene
- e) Waste

CHECKS — tool, 1000, blank

CHISELS
- a) Cape, ¾ in. and ⅝ in.
- b) Cold, ¾ in., ⅝ in., ¾ in., 1 in.
- c) Diamond point

COMBINATION SQUARES — 12 in.

COTTER-PIN EXTRACTOR

DIVIDERS — 6 in. and 10 in.

DRILL SETS
- a) 1/32 in. to ½ in., by 64ths
- b) ½ in. to 1¼ in., by 32nds

FILE CARDS

FILE HANDLES — assorted

FILES
- a) Flat bastard, 6 in., 8 in., 10 in., and 12 in.
- b) Half round, 6 in., 8 in., 10 in., and 12 in.
- c) Mill, 6 in., 8 in., 10 in., and 12 in.
- d) Round, 6 in., 8 in., 10 in., and 12 in.
- e) Square, 8 in., 10 in., and 12 in.

FIRE EXTINGUISHERS — Pyrene and Acid

FIRST-AID CABINET AND SUPPLIES

FLOOR BRUSHES — 18 in.

FUNNELS — tin, assorted sizes

GAUGES
- a) Air pressure
- b) Center
- c) Depth
- d) Thread
- e) Thickness

GLASS CUTTERS

GOGGLES

GREASE GUNS — plain and pressure type

HAMMERS
- a) Ball peen, 4 oz.
- b) Ball peen, 1¼ lb.
- c) Ball peen, 2 lb.
- d) Lead
- e) Riveting
- f) Sledge, No. 12

LADLE
- a) 3-in. bowl
- b) 6-in. bowl

LAMPS — extension, with reels

LEAD POT — gas

MAGNET CHARGER

METERS — volt and ammeter test

MICROMETERS
- a) Outside, 0 to 1 in.
- b) Outside, 2 in. to 3 in.
- c) Outside, 3 in. to 4 in.
- d) Inside, 1½ in. to 6 in.

MOLDS
- a) Battery nut
- b) Battery post
- c) Battery strap
- d) Burning stick
- e) Lead hammer

OILSTONE

PIPE TAPS — ⅛ in., ¼ in., ⅜ in., and ½ in.

PLIERS
- a) Combination, 6 in.
- b) Flat nose
- c) Roundnose

PULLERS
- a) Bearing
- b) Gear
- c) Wheel, hub type

PUNCHES
- a) Center
- b) Taper pin
- c) Blacksmith

PUTTY KNIVES

REAMER — spindle bolt

REAMER SETS
- a) Piston pin, ½ in. to 1⅜ in.
- b) Taper pin
- c) Valve seat

SAWS
- a) Hack, frames, 10 in., adjustable
- b) Hack-saw blades, 18, 20, and 24 teeth
- c) Hand

SCALES
- a) Steel, 6 in., graduated 1/64 and 1/100 in.
- b) Steel, 12 in., graduated 1/32 in.

SCRAPERS
- a) Bearing
- b) Carbon

SCREW DRIVERS
- a) 6 in. and 12 in.
- b) Small combination

SCREW EXTRACTORS

SCRIBERS

SNIPS — tin, 3 in. straight and 3 in. curved

SOLDERING COPPERS
- a) Assorted
- b) Electric
- c) Handles

SPRING SPREADERS

STAMPS
- a) Figures, 3/16 in.
- b) Letters, 3/16 in.

TAP-AND-DIE SETS
- a) Machine screw
- b) N.F. ¼ in. to 1 in.
- c) N.C. ¼ in. to 1 in.

TIRE TOOLS

TOOL KIT — metal box or canvas roll, empty

TWIST DRILLS — (extra sets) selected sizes

VALVE
- a) Grinders (hand)
- b) Spring lifters

WRENCHES
- a) 8 in., 10 in., 12 in., and 18 in.
- b) Ignition sets
- c) Pipe, 10 in., 14 in., 16 in., and 18 in.
- d) Rim socket
- e) Socket sets, large assortment with case
- f) Spark plug
- g) Speed wrenches
- h) Standard end sets, ¼ in. to ⅞ in., N.C. and N.F.
- j) Valve-tappet wrenches

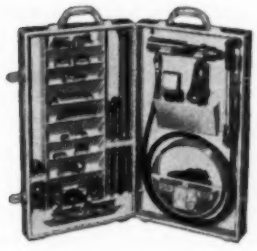
(Continued on page 56A)

MORE AND MORE SCHOOLS TEACH

Porto-Power METHODS...

7 BIG REASONS WHY

"Porto-Power" is a combination of a specialized hydraulic jack and attachments which can be adapted to push, pull, press, clamp, spread and bend. Easy strokes on the hand pump transmit oil under pressure to the compact ram — which operates at any angle.



A POPULAR KIT FOR SCHOOLS is this SA-18 "Bantam Porto-Power" Assortment. Its hydraulic unit has a 2-ton capacity which handles 90% of all body panel rebuilding requiring hydraulic power. The kit includes 23 attachments. Other "Porto-Power" units are available (in 2, 7, 10, 20 and 50-ton capacities) for schools with large budgets. The SA-18 "Bantam" Kit is a practical, basic minimum to demonstrate "Porto-Power" methods.

1. **"Porto-Power" is the easiest, most simple** hydraulic service equipment to use . . . causing its popularity in both schools and actual service.

2. **Students learn to operate what they later will employ in their work.** It is by far the most popular hydraulic service equipment.

3. **Only "Porto-Power" serves the full range of automotive rebuilding jobs.** Rebuilding operations are a major phase of automotive service.

4. **Only "Porto-Power" offers hydraulic tools for general automotive repair work.** It is thus important to students who will specialize in general repair service.

5. **Implement and tractor maintenance** requires "Porto-Power." Its use is promoted by leading tractor manufacturers.

6. **"Porto-Power" is popular in industry** — for maintenance and production. It is also important in laboratory and construction operations.

7. **"Porto-Power" is a major tool in the electrical field** for installation of pipe and conduit and in other electrical construction and maintenance.

BUY BLACKHAWK PRODUCTS FROM YOUR HOME-TOWN AUTOMOTIVE JOBBER. Also, leading Industrial Supply Distributors are a source for Blackhawk Industrial equipment. IMPORTANT! Only Blackhawk makes "Porto-Power!"

BLACKHAWK

HYDRAULIC JACKS — Blackhawk offers the preferred and most complete line of Hand and Service Jacks.

'RECK-RACK'—This low-cost device rigidly holds body sections for off-the-car roughout and metal finishing.

WRENCHES—Save up to 40% on socket wrenches —yet equip students with the world's finest professional tools.

FREE—Kit of Blackhawk literature for vocational school *instructors*. Helpful as text material and for selection of vital shop equipment. Includes free blueprints showing how you can build your own press.

BLACKHAWK MFG. CO., Dept. P3333, Milwaukee 1, Wis.
Send free kit of instructor's literature.

Name .....

Position .....

School .....

Address .....
Street City State

Automotive Shop — Materials and Supplies

(Continued from page 54A)

ABRASIVE CLOTH AND PAPER — aluminum oxide and silicon carbide
ACETYLENE GAS — in drums, for welding
ACID
ALCOHOL
BABBITT
BEARING BLUE
BEARING COMPOUND
- *a*) 600W
- *b*) Penetrating

BOLTS
- *a*) Machine, selected sizes
- *b*) N.F. selected sizes
- *c*) Stove, flat or round heads, selected sizes

BRAKE JUICE — ½-pt. cans
BRUSHES
- *a*) Paint
- *b*) Spark plug
- *c*) Spoke
- *d*) Steel
- *e*) Varnish

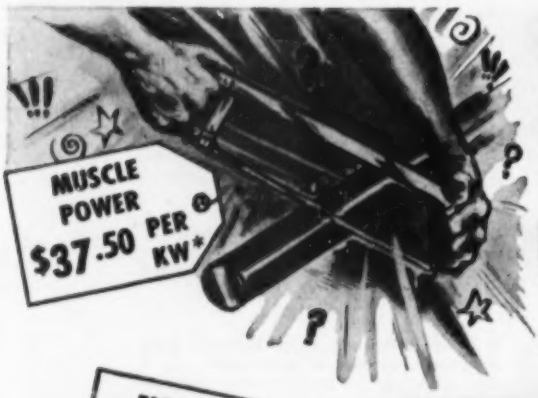
CHAMOIS
COIL-SPRING ASSORTMENT
COPPER TUBING
COTTER PINS — assorted sizes
CROCUS CLOTH
DISTILLED WATER
DRAIN COCKS
ELECTROLYTE
ENAMEL — AUTO PAINTING
GASKETS
- *a*) Copper asbestos
- *b*) Cork and felt
- *c*) Flange

GASOLINE
GREASE — cup, cans
KEROSENE
KEYS, WHITNEY — assorted
LACQUER — colors
LEAD
LUBRICANT — transmission
NAILS AND BRADS
NUTS
- *a*) N.F., castellated. square, hexagon, selected sizes and kinds
- *b*) N.C., square and hexagon, selected sizes
- *c*) Machine screw, selected sizes
- *d*) Wing, selected sizes

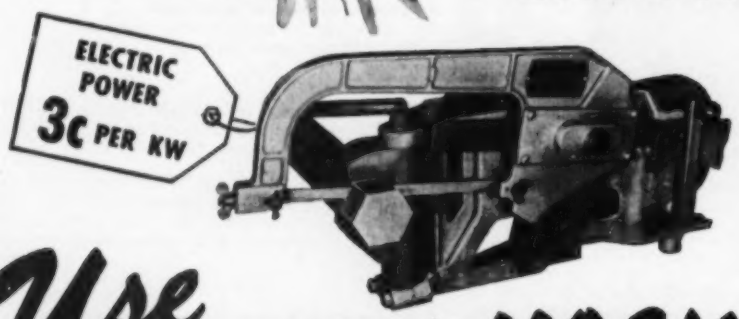
OIL
- *a*) Cylinder, light, medium, and heavy

OXYGEN — in drums for lead burning
PIG LEAD

(Continued on page 59A)



STOP Hand Hacksawing LABOR



Use HAND-I-HACK** PORTABLE POWER HACKSAW

Muscle is the most expensive power known and it produces the least satisfactory results. Especially in hacksawing!

Stop this time waste and drudgery — Use HAND-I-HACK. It will do most hacksawing jobs usually done by hand — because it works in any position, can be carried anywhere to the job, quickly pays for itself in labor saving and improved work. Capacity 3" x 3". Write for catalog and name of dealer.

INSTRUCTORS: Write today for full information.
SCHOOL SHOP DEALERS: Write for our dealer proposition.

*One man's energy output approx. 40W
**Trade Mark Reg. U.S. Pat. Off.

Lipe-ROLLWAY CORPORATION
Manufacturers of Automotive Clutches and Machine Tools
830 Emerson Ave., Syracuse 1, N. Y.

YOU AND YOUR FUTURE JOB

(Continued from page 52A)

11. *Transportation* (work of moving people and goods): aviator, bus driver, conductor, dispatcher, fireman, freight agent, hostess, locomotive engineer, mechanic, seaman, switchman, taxi driver, truck driver.

Human Relationship

A very important part of every job requires one's co-operation with others. One must not forget that life's activities have a great deal to do with earning a living *while living with others*. You must cultivate a good sense of diplomacy and tact in order that you may, without disagreement, associate and work with others. There are many people with ability who don't work. They are the people who do not help carry the load. They put some of their work away for others to do. They don't want to work hard enough to do all of their job. These so-called workers not only spoil things for themselves, but also make the job difficult for their fellow workers. The most important factors in one's success are honesty and hard work, therefore make it your policy to do an honest day's work every day. The individual who will most likely progress and succeed in his chosen vocation is the one who possesses the essential good qualities of character, workmanship, punctuality, loyalty, initiative, imagination, reliability, co-operation, and a strong tendency to do what is right, just, and honorable. Human relationship must not be disregarded when choosing your life vocation.

Conclusion

With this diagnostic estimate of yourself you will be better equipped to study and understand the requirements of the

(Continued on page 59A)

TRAIN THEM WITH EQUIPMENT
PREFERRED BY THE INDUSTRY

CURTIS PRECISION-BUILT AIR COMPRESSORS · AUTO LIFTS CAR WASHERS

99 Years of Manufacturing "Know-How"

AIR COMPRESSORS
¼ THROUGH 10 H.P.

Dependable, trouble-free performance —

Timken roller main bearings

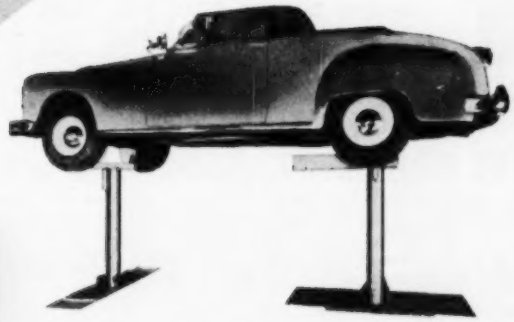
Positive unloaded starting

"Centro-Ring" lubrication

ASME tank — Deep penetrating welds

HYDRAULIC CAR WASHERS
(300 Pounds Pressure)

More cars can be washed cleaner in less time with this silent, self-oiling power washer.



FULL HYDRAULIC TWO-POST SHOP LIFT

Complete accessibility for better, faster work — Ample lifting height — Provides safe pick-up — 60" wheelbase range — Minimum installation cost.

SINGLE POST LIFTS —

Full and semi-hydraulic

Free-wheel platform

Roll-on platform

Other Curtis Products

LARGE VOLUME AIR COMPRESSORS, up to 50 H.P. — water cooled.

AIR HOISTS AND AIR POWER CYLINDERS — for low cost material handling, pushing and pulling operations.

For complete information on any of these products, mail a post card to Curtis listing the products in which you are interested.

CURTIS
PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1909 Kienlen Ave. · St. Louis 20, Mo.

A-51-3

TEACH LABOR SAVING METHODS WITH WALTON TOOLS

(1) WALTON TAP EXTRACTORS

CUT COSTS OF REMOVING BROKEN TAPS

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads.

(2) WALTON-AMERICAN TOOL HOLDERS

REDUCE TOOL CHANGE-OVER TIME

Many holders in one. Head will swivel around an entire circle. May be set for straight, right or left hand offset positions. Will hold with perfect grip any size square or round tool bit or boring bar from ⅛" to 5/16". All changes quickly made at the machine.

(3) "REPS" PIPE & STUD EXTRACTORS

REMOVE BROKEN PIPES AND STUDS EASILY AND QUICKLY

When faced with broken pipes or studs that defy movement — here's the tool. Makes a strong, four-point grip without need for hammering or pounding. Hardened steel — will remove any material.

Send for Catalog No. 32 of all Walton Tools.

THE WALTON CO., Hartford 10, Conn.

McKnight Publications

"METALWORK TECHNOLOGY AND PRACTICE"

By O. A. Ludwig. Complete textbook on general metalwork . . . hand and machine. Describes tools, materials and operations common to many metalworking occupations. 19 page index with over 4,000 entries. Considered "most complete book on metalwork ever published." 662 pages, cloth bound. Send for approval copy. $4.40

"MACHINING OF METAL"
By Robert E. Smith. Instruction on operation and care of machines. Cloth cover. $3.50

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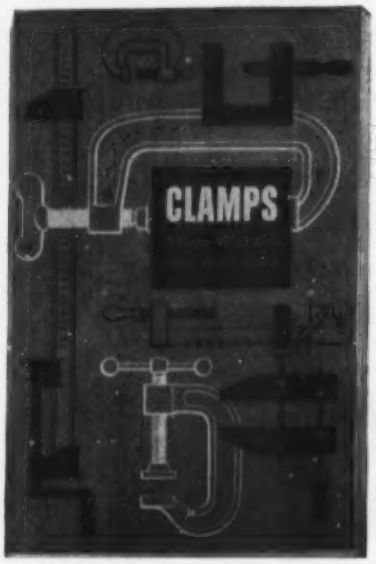
By R. E. Jennings. General text for beginners. Stresses common practices and safety procedures. $1.25

McKNIGHT & McKNIGHT
Dept. 118 Market & Center Sts. Bloomington, Ill.

Write for This FREE Booklet Today



Interesting
•
Informative
•
Adaptable to the Classroom
•

Catalog also available showing Clamps for every purpose, Chisels, Punches, Brace Wrenches, Star Drills, Washer Cutters, File Cleaners, Etc.

THE CINCINNATI TOOL COMPANY
Waverly and Main Cincinnati 12, Ohio

MAYLINE

The Mayline School Line Tops the Field

This Drafting and Art Classroom Table is one of many fine products.

DOUBLE WORK BENCH

A proud addition to any wood shop. Thick, hard Maple top, solid oak base — natural finish, rapid acting vise. Also available as a single work bench.

ALL PRODUCTS SOLD DIRECTLY TO SCHOOLS

ENGINEERING MANUFACTURING CO.
623 No. Commerce St. Sheboygan, Wis.

MAYLINE

MAYLINE

MAYLINE

AUTOMOTIVE SHOP — MATERIALS AND SUPPLIES

(Continued from page 56A)

PISTON-RING COMPRESSORS
RADIATOR HOSE
RIVETS — brake lining, 5/16 in., 1/2 in., and 3/4 in. long
SCREWS
- *a*) Flathead or roundhead, iron or brass, selected sizes and kinds
- *b*) Cap and machine, iron or brass, selected sizes and kinds

SEALING COMPOUND
SHELLAC — 1/2-pt. cans
SHIM STOCK
SOAPSTONE
SOLDER — bar, wire, or self-fluxing wire
SOLDERING PASTE
SPELTER — for brazing
SPONGES — 1/2 lb.
STARTING CABLE
TACKS AND STAPLES — upholstery
TIRE
- *a*) Carcass fabric
- *b*) Cushion stock
- *c*) Inner-tube repair stock
- *d*) Patching cement
- *e*) Patches
- *f*) Putty
- *g*) Tread stock
- *h*) Vulcanizing

VALVE-GRINDING COMPOUND — coarse and fine
WASHERS
- *a*) Lock, assorted sizes
- *b*) Wrought iron

WASTE
WIRE — primary and secondary

YOU AND YOUR FUTURE JOB

(Continued from page 56A)

foregoing fields of work, be in a better position to weigh the advantages and disadvantages of suitable occupations, and finally, be able to make a choice which will best benefit you and society and result in real joy in living.

VISUAL AID FOR ARCHITECTURAL DRAFTING

R. L. GRANDLE
Drafting Instructor
East High School, Wichita, Kans.

The full size cornice details shown in the illustrations, were built and mounted on panels so that they are always available for the students' examination. See page 60A.

The sections of the cornice were built of full-size pieces of lumber such as may be found in any lumberyard, and used in house construction. The sections are about 4 in. thick and are built in the same manner as is used in home construction in this locality. The sections are complete and include all parts of a cornice from stud to wallboard, and include the hard to show items, such as roof boards, building paper, and sheathing.

After the cornices were built, the various parts were painted with Tempera or very bright show card colors, such as, red, green, blue, and yellow. Each part was painted a contrasting color to the parts adjacent to it. After the paint was dry, the entire cornice was sprayed with two coats of white shellac. This helps to brighten the colors, keeps them from wearing off, and makes it easier to remove any dust which may settle on the models.

After painting, the cornices were mounted on panels made of 1/4 by 24 by 30-in. plywood. Wood screws were used to fasten the cornices to the panels so that they may be removed for examination if desired. The various parts were labeled for identification purposes.

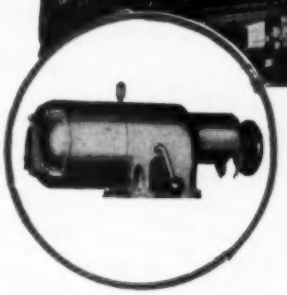
The cornices are hung with picture frame wire at the front of the room so that they can be seen from any location in the room.

I have found that not only do these full-size cornices create quite a bit of interest but are a great help in showing the construction of cornices in my architectural drawing classes, as each part stands out and is easily distinguished from the other parts. I find the students constantly examining them when they have one to draw instead of just guessing or drawing a few lines — not knowing what they were doing.

modernize your machine shop now

install America's no. 1 machine tool drive...

the LIMA Gearshift DRIVE



Progressive schools everywhere are selecting LIMA DRIVES to modernize their present lineshaft driven machine tools — economically.

Photo above shows the installation of LIMA GEARSHIFT DRIVES at the Syracuse Vocational High School, Syracuse, New York.

LIMA DRIVES with all working parts enclosed, provide the utmost in functional safety, as well as adequate lighting, proper machine location and complete elimination of hazardous lineshafting.

Complete engineering facilities available

WRITE FOR LITERATURE

LIMA GEARSHIFT DRIVES & MOTORS

Representation in principal cities

THE LIMA ELECTRIC MOTOR COMPANY 3461 FINDLAY ROAD, LIMA, OHIO

Visual aids for architectural drafting

TOOLDOWN—A TEACHING DEVICE

A. R. DAHL
Metal and Machine Shop Teacher
Lincoln Junior High School
Santa Monica, Calif.

Are your boys really enthusiastic about this matter of learning the correct nomenclature of tools? This is an old technique applied to a new subject. It gives new life and additional interest to an important objective of industrial arts. My students call it a *tooldown* because it is much like the old-fashioned *spelldown*.

To have a tooldown, have the students stand and line up just as is done for a spelldown. Then starting at one end, ask the boys in succession to give the name of a tool. It might be wise to help them by defining the difference between tools, materials, and supplies. Each boy is to give the name of a different tool. A student is disqualified and must return to his seat if he repeats the name of a tool already given by another boy, or if he takes too long to think of a name. The naming of a tool not used in the shop or an incorrect term will also disqualify.

A time limit for naming a tool should be set before the game gets under way. Experi-

3 BUSS PLANERS
IDEALLY SUITED TO VOCATIONAL TRAINING
Ranging in capacity and price to suit each teaching and budget requirement.
STANDARD PLANERS that are widely used in industry as well as school shops.
Operated and adjusted identically with larger planers.
Built for high quality planing with maximum safety.
Incorporating big planer features such as built-in knife grinder and jointer which enables instructor to keep the knives sharp with little time and effort required, thus permitting student to do good work.
Built by the leaders in the planing field.
Planer specialist since 1862.
for the planer that exactly suits your needs, write for complete descriptive folder.
BUSS MACHINE WORKS
254 EIGHTH ST., HOLLAND, MICH.
BUSS No. 4L Wedge adjusted bed. Capacity 24" x 8". The finest which may be had for school shop training.
BUSS No. 248 Capacity: 24" x 8". Double Hoist Screw bed. Other than the No. 208, there is nothing in the low-cost planer field that approaches it as a sound school shop investment.
BUSS No. 208: Capacity: 20" x 8". The lowest-cost, thoroughly practical planer on the market.

ence shows that ten seconds is adequate, disqualifying a boy if he takes longer. In the last stages where there are only two or three boys remaining and most of the common and well-known tools have been utilized, it seems advisable to give additional time.

It has been found that in a class of 24 it takes between 10 and 20 minutes to conduct the tooldown.

Quite by chance this mode of instruction was hit upon one day in a class discussion. The plan as set up by the students was immediately put into action. As a result considerable enthusiasm was shown, and there was an immediate request by the students for more of the same. The success of this method is best indicated by the difference that has been noted in the vocabulary of the students when asking for tools at the tool crib. Instead of pointing and asking for "that thing" the feliows are now calling for the tools by their full and proper name. The boys have even gone to the point of secretly making lists of tools that they feel the other students may have overlooked.

In my class, where a point system of grading is used, the winner of the tooldown is given additional points toward his grade. Perhaps extra credits can be given by making provision in the grading system that you currently use in your shops.

Give this game a try and notice the big difference that it makes. Instead of calling the screen for sifting the foundry sand a "sifter" they are soon using the correct term "riddle."

Perhaps other applications may be made by having various types of *downs*, using such topics as materials, supplies, fastening devices, metals, woods, etc.

♦ 5,000 years of progress in forging metal will be shown in a 20-minute sound motion picture now in production for the Utica Drop Forge & Tool Corporation.

The story will trace the use of pliers and wrenches through the centuries. Three-dimensional, activated dioramas will be used to show ancient methods of smelting and forging. The Metropolitan Museum of Art has contributed friezes of Egyptian bronze forgings to add background for scenes of that period in history.

The craft shops of Kenneth Lynch & Sons of Wilton, Conn., who have produced armor for Hollywood films, collectors and museums, were engaged to produce medieval tools for the film, and the Village Blacksmith Shop of the re-created Village Crossroads of the Farmers Museum at Cooperstown, N. Y., has been photographed to depict the hand forging of a wrench to service a carriage actually owned by Alexander Hamilton.

Other scenes will show the manufacture of drop forged wrenches in the local plant and also the latest method of forging where thousands of pounds of pressure forge parts to a tolerance of a few thousandths of an inch.

For information on reservations, etc., write to *Utica Drop Forge & Tool Corp., Utica 4, N. Y.*

WIREMOLD's Modern Wiring Methods make Better Electricians!

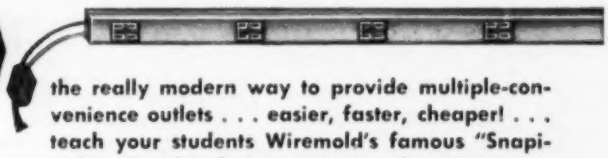
You're preparing your students for better jobs . . . making them better electricians . . . when you teach them how to install Wiremold, Plugmold and Pancake wiring systems. More and more, builders are asking for these modern wiring systems, and more and more architects are specifying them. Your students should know how to install them right!

WIREMOLD Helps You in your teaching!

Wiremold gladly makes a great many teaching aids available to you. . . . For the asking, you may have Wiremold Catalogs, and Wiring Guides, Wiremold Instruction Sheets, Wiremold Reference Charts and Engineering Data Sheets. All of these are clear, practical and useful — they show Wiremold products in detail and give step-by-step instructions in installation. Wiremold representatives have long been friendly "consultants" to teachers in the vocational and technical fields.

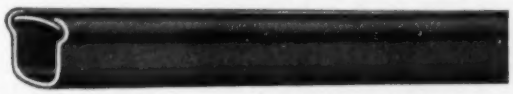
RIGHT NOW WHEN YOU'RE MAKING OUT YOUR REQUISITIONS AND BUDGETS, BE SURE TO PLAN FOR THE ASSORTMENT OF WIREMOLD RACEWAYS AND FITTINGS YOU'LL NEED IN YOUR TEACHING!! If you don't already know WIREMOLD, a letter will bring helpful information to your desk by return mail!

PLUGMOLD



the really modern way to provide multiple-convenience outlets . . . easier, faster, cheaper! . . . teach your students Wiremold's famous "Snapi-coil" principle of convenience outlet wiring!

WIREMOLD



easy-to-install surface raceways that simplify the whole wiring job from panel box to outlets . . . best way to wire most buildings — and the ONLY way to wire many buildings!

PANCAKE

low-ramp, trip-proof over floor raceways that carry wiring for light and power, or telephone and other communication circuits SAFELY to the point of use!

Be sure that your students know the newest, most modern methods of electrical wiring . . . WIREMOLD is glad to help you!

The WIREMOLD Company
HARTFORD 10, CONNECTICUT

Woodworking Equipment, Tools, and Supplies

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

BENCH
- *a*) Shop, with hardwood tops, 1¾ in. or over in thickness, the top to project far enough to allow a rapid-acting or continuous-screw vise to be attached.
  It may be well to order a 1-in. birch or maple board wide enough to cover the working face of the bench at the time of buying the benches. This board can then be fastened to the top proper with screws and may be conveniently replaced when worn. The benches should be made of thoroughly kiln-dried lumber throughout. They may be either plain or of 6-drawer type
- *b*) Glue
- *c*) Stain, with metal-covered top
- *d*) Teacher's demonstration

BLACKBOARD — permanent or portable

BOOKCASE

BULLETIN BOARD

CABINETS — wood or metal for filing class records, instruction sheets, drawings, finishing materials, hardware, small tools, supplies, etc.

CHAIRS — teacher's and tablet arm

CORE OVEN — for patternmaking class

DESK — teacher's, with drawer compartments

FURNACE — for melting soft metals (for patternmaking class)

GLUEPOT — 1 qt. or 2 qt., electric, gas, or steam heat

GLUE WARMER OR COOKER — 1- to 5-gal. capacity

GRINDER
- *a*) Automatic knife, direct-motor-type. Size to suit largest knife used in school shop, complete with water pump, grinding wheel, and automatic stops
- *b*) Bench, hand or power
- *c*) Bench, motor-in-head. Motor bearings to be completely housed, wheels to be equipped with safety flanges and carefully guarded throughout. One fine-grit, and one coarse-grit wheel
- *d*) Revolving oilstone, pedestal type, with one fine and one coarse oilstone

JOINTER
- *a*) 6-in. or 8-in. portable jointer. Table to be fitted for rabbeting. Safety-cylinder type, equipped with safety guard.
- *b*) 12, 16, or 18 in. direct motor drive, ball bearing. Cylinder to be of safety-head type. Table to be fitted for rabbeting. Jointer to be equipped with safety guard.

LATHES
- *a*) 6-in. to 16-in. motor-in-head, motor-in-base, or belt-driven speed lathe, to take 24, 36, 48, 60, or 72 in. between centers. Each to be complete with cup center, spur center, faceplate, rosette chuck, tool rests, and center drift for head block.
- *b*) Patternmakers', with end faceplate provision. Lathe to be of direct-motor-drive type, equipped with variable speed motor, faceplates and floor stand. (For patternmaking class)

MORTISER
- *a*) Direct-motor-drive, or belt-driven, hollow-chisel mortiser, foot feed. Table to be of the tilting type with hold-down clamps and stop rod.
- *b*) Portable, vertical, hollow-chisel mortiser, bench type

PLANER — 12, 18, 20, 24, or 30-in., motor or belt driven, single-surface planer. Safety-head cylinder, three-knife type, fitted with good-grade steel knives. Knife-setting and jointing device complete with bar should be mounted on machine if possible.

SANDER
- *a*) Belt, direct motor drive
- *b*) Disk, motor or belt driven
- *c*) Oscillating spindle, motor driven
- *d*) Portable, hand-plane type, direct motor drive
- *e*) Vertical spindle and disk sander

SAWS
- *a*) Band saw, 20 to 36 in., motor drive. Upper and lower wheels to be completely guarded. Table to tilt to 45 deg.
- *b*) Combination, band saw, crosscut saw, ripsaw, and mortiser. Machine to be completely guarded.
- *c*) Cutoff, pedestal or swing type to be fitted with 12-in. to 16-in. saw
- *d*) Filing machine, direct motor drive
- *e*) Jig, direct motor or belt driven
- *f*) Portable band saw, 14 to 20 in. ball bearing, motor driven
- *g*) Saw bench, directly connected to motor, and to have both rip and crosscut saws. Rip and crosscut gauges also to be provided
- *h*) Universal saw bench, 14 to 16 in., motor driven
- *j*) Variety saw bench, motor driven, tilting table, with universal sliding table. The arbor is to be fitted for a dado head, and the table is to be slotted accordingly. The saw is to be equipped with ripping fence and miter cutoff gauges

SHAPER
- *a*) Motor drive, single or double spindle. Table to be equipped with removable center plate.
- *b*) Portable shaper or router with a suitable selection of cutters

TENONER — single end, with coping heads and cutoff saw

VISES — rapid-acting or solid-nut type woodworking-bench vises, 7 to 10 in.

WOOD TRIMMERS — complete with all gauges and taper pins. Base of trimmer to be slotted and laid out for degree settings (for patternmaking class.

Woodworking — Small Tools

AWLS — brad, assorted sizes

BEVELS
- *a*) Protractor
- *b*) Sliding T, 8 in.

BITS
- *a*) Auger, 3/16 in. to 1 in., inclusive, by 16ths
- *b*) Auger, 3/16 in. to ½ in. inclusive, by 16ths
- *c*) Braces, ratchet type, 8-, 10-, 12-, or 14-in. sweep
- *d*) Countersink, for wood, rose pattern, ½ in. and ⅝ in.
- *e*) Dowel, square shank, ¼ in., 5/16 in., ⅜ in., ½ in., ¾ in.
- *f*) Expansive, ⅞ in. to 1½ in.
- *g*) Expansive, ⅞ in. to 3 in.
- *h*) Forstner, square shank, ¼ in. to ½ in. inclusive, by 16ths
- *j*) Screw driver square shank, ¼ in., 5/16 in., ⅜ in.
- *k*) Twist drill for wood, square shank, 1/16 in. to ⅜ in. inclusive, by 16ths
- *l*) Twist drill, straight shank, 1/16 in. to ⅜ in., inclusive, by 32nds

BLOWTORCH

BROOMS

BRUSHES
- *a*) Bench duster, 10 in.
- *b*) Floor
- *c*) Glue, round, 1½ in. and ¾ in.
- *d*) Glue, round, 1½ in.
- *e*) Marking, camel's hair, No. 1 and No. 2
- *f*) Varnish, flowing, 2 in. and 2½ in.
- *g*) Varnish, flat, ½ in., ¾ in., and 1 in.

BURNISHERS — oval or round

CAN OPENER

CARVING TOOLS
- *a*) Sets containing 6 tools
- *b*) Sets containing 12 tools

CHISELS
- *a*) Cold, machinists', ⅜ in. and ½ in.
- *b*) Mortising chisel and bits, ¼ in. to ⅝ in. by 16ths
- *c*) Socket firmer, bevel edge, ⅛ in., ¼ in., ½ in., ¾ in., 1 in., and 1½ in.
- *d*) Socket firmer, plain edge, ½ in., ¾ in., and 1 in.
- *e*) Tanged firmer, bevel edge, ⅛, ¼, ½, ¾, 1, and 1¼ in.

CLAMPS
- *a*) Bar, 24, 36, 48, and 60 in.
- *b*) Hand-screw, 4, 5, 6, 7, 8, 10, 12, and 14 in.

(Continued on page 64A)

BASIC VOCABULARY FOR RELATED SPELLING IN AUTO MECHANICS

ERNST H. SUERKEN

Supervising Principal

Union Free School District, Greenburgh No. 11

Dobbs Ferry, N. Y.

The following material is planned to develop the material on the related areas of auto mechanics. The foundation on which this work is based is the psychological principle proved by research that words have power and the more words that we can command adequately in our working vocabulary in relation to our area of interest — carpentry, electricity, printing, etc. — the more helpful will one be in his field. The second principle employed is that of interest motivation. The student who is keenly interested in *auto mechanics* will be more interested in learning to spell and know the meanings of words which have value in that area of learning. It should be understood that we are speaking of a related vocabulary which is over and above and in addition to the normal vocabulary acquired in the elementary and junior high school on the academic level. A related vocabulary will also help in the area of related English where a student would prefer perhaps to write about subjects in the area of his interest if he has an adequate vocabulary of words and phrases which he can spell and use.

A rich background of meaning should be built up in connection with each spelling word. Pictures, objects, diagrams, charts, and conversation all aid in developing meanings and enriching understanding by

(Continued on page 69A)

Rider College Chooses DELTA Power TOOLS for its Management Laboratory

Unerring accuracy, proven dependability, low operating and maintenance costs called major factors in success of project.

- Established 87 years ago for teaching the fundamentals of modern business practices, Rider College of Trenton, New Jersey, maintains a Management Laboratory directed by Prof. Rocco J. Battista and equipped with a Delta lathe, 14" drill press, 14" band saw and 6" jointer.

Going far beyond the usual definition of the term "Vocational," Rider not only stresses technical skills and methods, but also seeks to inculcate sound concepts of production control and shop management; and looks upon its Delta equipment as a major factor in the widely acknowledged success of its program.

Delta tools were selected, says Prof. Battista, for their dependable accuracy, durability and low cost of operation and maintenance. Furthermore, Rider College expects to purchase additional Delta equipment to implement a course on the elements of time and motion studies in plant maintenance work.

It's an axiom of veteran vocational educators that for day-in, day-out reliability you can't beat Delta Power Tools. Ask your Delta dealer (he's listed in your Classified Telephone Directory under "Tools") about them—or write direct for latest catalogs to Delta Power Tool Division, Rockwell Manufacturing Company, 402 C N. Lexington Avenue, Pittsburgh 8, Pa.

DELTA MILWAUKEE *DELTA QUALITY MAKES THE DIFFERENCE!*

DELTA QUALITY POWER TOOLS

Another Product of **Rockwell**

(Continued from page 62A)

DIVIDERS — wing, 6 in. and 10 in.
DOWEL PLATE — 6 in. long.
DOWELING JIGS — with bushings
DRAWKNIVES — 7 in.
DRILL
- *a*) Automatic hand, with 8 drill points
- *b*) Chuck, 0 to 3/8 in.
- *c*) Hand, 0 to 3/8 in., for round-shank drills
- *d*) Star, for concrete, 1/2 in. and 3/4 in.

FILES
- *a*) Auger bit, assorted, 6 in.
- *b*) Cabinet, 8 in. and 10 in.
- *c*) Card and brush
- *d*) Flat, wood, 10 in.
- *e*) Mill, bastard cut, 12 in.
- *f*) Round, bastard cut, 12 in.
- *g*) Taper, slim, 5 1/2 in. and 7 in.

FIRST-AID CABINET AND SUPPLIES
GAUGES
- *a*) Bit, adjustable
- *b*) Jointer
- *c*) Marking, metal or hardwood
- *d*) Mortise, metal or hardwood
- *e*) Panel

GLASS CUTTER
GOUGES
- *a*) Tanged firmer, outside ground, handled, 1/8, 1/4, 1/2, 3/4, and 1 in.
- *b*) Tanged firmer, inside ground, handled, 1/8, 1/4, 1/2, 3/4, and 1 in.
- *c*) Spoon, 1/2, 3/4, and 1 in.

HAMMERS — claw, bell faced, 10, 12, 13, and 16-oz.
HATCHET — bench, 4-in. cut.
JARS — earthenware, 1-qt. capacity
KNIVES
- *a*) Jointer, to fit power machine
- *b*) Planer, to fit power machine
- *c*) Sloyd, 3-in. blade

LEVELS
- *a*) Wood, 24 in.
- *b*) Machinists', 12 in.

MALLETS — hickory, 3 by 5 in. head
NAIL SETS — 1/16 in. and 3/32 in. points
OILERS — bench, 1/2 pt., coppered, best grade
OILSTONES
- *a*) 1 by 2 by 8 in. in iron box
- *b*) Gouge slip, medium, 4 1/2 by 2 1/8 by 5/8 by 5/16 in.
- *c*) Gouge slip, fine, 3 by 2 by 3/4 by 3/4 in.

PINCERS — 6 in. carpenters'
PINCH DOGS — 3/4, 1, and 1 1/4 in.
PLANES
- *a*) Block, adjustable, 6 in. long, 1 5/8-in. cutter
- *b*) Circular
- *c*) Combination, adjustable
- *d*) Core box
- *e*) Duplex, fillister and rabbet
- *f*) Fore, 1/8 in., 2 3/8-in. cutter
- *g*) Irons, double
- *h*) Jack, 14 in., 2-in. cutter
- *j*) Jointer, 24 in.
- *k*) Round, wood, 1 3/4 in.
- *l*) Router
- *m*) Smooth, 9 in., 1 3/4-in. or 2-in. cutter

PLIERS
- *a*) Roundnose, 5 in.
- *b*) Side-cutting, 6 in.

PUTTY KNIVES
RASPS — half round, wood, 10 in.
RULES
- *a*) Board
- *b*) 1 ft. or 2 ft. graduated by 8ths and 16ths
- *c*) Shrink, 1/8 in., 3/16 in.

SAWS
- *a*) Back, 1 1/2 in., 14 point
- *b*) Band, to fit power machine
- *c*) Compass, 10 in.
- *d*) Coping, frames
- *e*) Coping, blades
- *f*) Crosscut, 9 tooth, 22 in. long
- *g*) Crosscut, circular for power machine
- *h*) Dado, 1/8 in. to 1 1/16 in. to fit power-saw arbor
- *j*) Hack, frames, 10 in. or adjustable
- *k*) Hack, blades, 10 in.
- *l*) Keyhole, 10 in., 10 point
- *m*) Rip, 7 point, 22 in. long
- *n*) Rip, circular for power machine
- *o*) Set, 10 points per inch and finer
- *p*) Set, 10 points per inch and coarser
- *q*) Turning frame, 14 in.
- *r*) Turning blades, 3/16 by 12 in., 10 tooth
- *s*) Miter box, 24 by 4 in. saw, 7 in. capacity at miter

SCRAPERS
- *a*) Cabinet
- *b*) Glue, triangular
- *c*) Veneer, blade, 2 3/4 in. long, handle 11 in. long

SCREW DRIVERS
- *a*) Cabinetmakers', 4, 6, and 8 in.
- *b*) Quick return, spiral ratchet

SHOOT BOARD — and plane
SNIPS — tinners', forged steel, 2 1/2-in. cut
SPOKESHAVES — adjustable, raised handle, 10 in. long
SQUARES
- *a*) Combination, 12 in.
- *b*) Try, iron handle, 8 in.
- *c*) Framing, 2 ft.

STEEL FIGURES — hand cut, 1/8 in.
TAPELINE — 50 ft., steel
TRAMMEL POINTS — adjustable metal frame, steel points
TURNING TOOLS
- *a*) Calipers, 6 in. inside and outside
- *b*) Calipers, 12 in. inside and outside
- *c*) Parting tools, 1/8 in.
- *d*) Round point, 1/4 in., 1/2 in., 3/4 in.
- *e*) Spear point, 1/4 in., 1/2 in., 3/4 in.
- *f*) Square point, 1/4 in., 1/2 in., 3/4 in.
- *g*) Turning chisels, 1/4 in., 1/2 in., 3/4 in.
- *h*) Turning gouges, 1/4 in., 1/2 in., 3/4 in.
- *j*) Turning skews, L.H., 1/4 in., 1/2 in., 3/4 in.
- *k*) Turning skews, R.H., 1/4 in., 1/2 in.

VISE — 3-in. jaw, anvil face
WRENCHES
- *a*) Adjustable, 8, 10, and 12 in.
- *b*) Headless setscrew
- *c*) Pipe, 10 in. and 12 in.
- *d*) S type or open-end type to fit 1/8-in. to 1-in. N.C. nuts

(Continued on page 66A)

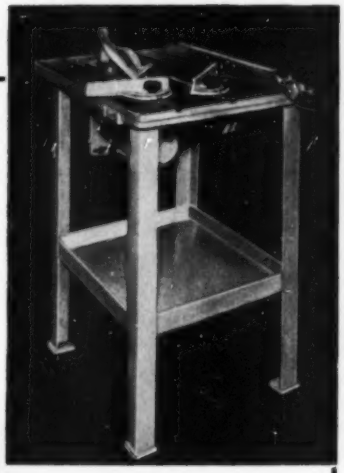
PARKS No. 20
20" PLANER

Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.

The PARKS Heavy-Duty 12" x 4" Planer

A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.

The PARKS WOODWORKING MACHINE CO., Dept. 22-A23 1546 Knowlton St., Cincinnati 23, O.



New

TILTING ARBOR SAW

The **King** *of Quality*

The new 8 inch Tilting Arbor Saw by H & A is truly "The King of Quality!" Heavy cast iron table. Life sealed ball bearings. Motor *that tilts with the saw* — to assure complete alignment of parts at all times. Here's a saw that is built for continuous use all day long, every day! It's the choice of woodworkers who insist upon *quality*.

WRITE TODAY! Write for FREE literature, name of nearest authorized dealer.

HESTON & ANDERSON
DIVISION OF ST. PAUL FOUNDRY & MFG. CO.
15-6D FAIRFIELD, IOWA

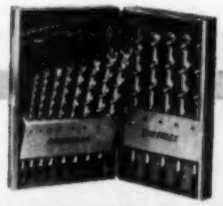
YOU'LL FEEL AT HOME

. . . with this Sjöström work bench because you will quickly recognize and long appreciate its practical design and the painstaking care with which it was built. School supervisors who install, and students who use, fine equipment like this usually take the same sort of pride in using and properly maintaining it that we take in building it. Several types of benches are available. Feel free to write for our data sheet which describes all types.

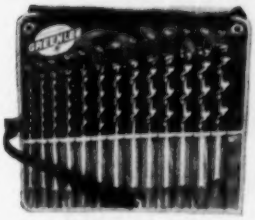
JOHN E. SJÖSTRÖM COMPANY
1712 NORTH TENTH STREET, PHILADELPHIA 22, PA.

for fast, clean boring

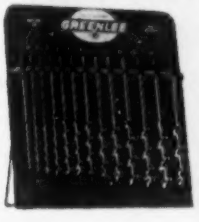
GREENLEE 22 SOLID-CENTER AUGER BITS make good workmanship come easy. Smooth, *accurate* holes are bored swiftly because solid-center design gives extra strength and provides positive, fast chip clearance. Correctly formed screw point and cutting edges last through long use. "Induction Heat-Treated" for uniformity, long life . . . "Plastic-Sealed" to reach you factory-sharp. Buy singly or in sets, as shown below.



Set of 13 bits in steel box. Hang up or stand on shop bench.



Sets of 6, 8, 9 or 13 bits in plastic roll. Grommets for hanging up.



Set of 13 bits with convenient metal holding panel. Easel for standing up. Holes at top for hanging.

TOOLS FOR CRAFTSMEN
GREENLEE

FREE FOLDER gives details on GREENLEE 22 Solid-Center Auger Bits and other fine hand tools in the GREENLEE line. Write Greenlee Tool Co., 2023 Twelfth St., Rockford, Ill.

(Continued from page 64A)

Woodworking — Materials and Supplies

ALCOHOL

BENZINE

BRADS — 3/8 in., 1/2 in., and 5/8 in. No. 20; 3/4 in. and 7/8 in. No. 19; 1 in. No. 18; 1 1/4 in. and 1 1/2 in. No. 16; 1 3/4 in. No. 15; 2-in. and 2 1/2 in. No. 14

CARBON PAPER — black

COLORS — dry: burnt sienna, burnt umber, cobalt blue, chrome yellow, drop black, lamp black, Prussian blue, raw umber, Vandyke brown, and vermilion

COLORS — ground, in oil or japan: burnt sienna, burnt umber, cobalt blue, chrome yellow, drop black, lamp black, Prussian blue, raw umber, rose lake, Vandyke brown, and vermilion

DECALCOMANIA TRANSFERS

DOWEL PINS AND PLATES

DOWELS: hardwood, 3-ft. lengths, 1/4 in., 5/16 in., 3/8 in., 1/2 in., 3/4 in-

ENAMEL
- *a*) Selected colors
- *b*) Undercoater

FILLERS — paste: natural, golden oak, dark oak, and mahogany

FILLETS — leather, 1/4 in. and 1/2 in.

GLUE
- *a*) Casein, hide, best grade cabinet
- *b*) Liquid

HARDWARE: Brackets, buttons, butts, casters, catches, chain, chest corners, chest trimmings, corner braces, corner irons, corner plates, desk fittings, door fittings, escutcheons, fasteners, handles, hangers, hinges, hasps, holders, hooks, knobs, latches, lamp fittings, lid supports, locks, pulls, smoking-stand outfits, springs, stops, supports

HOOKS
- *a*) And eyes
- *b*) Cup
- *c*) Screw and
- *d*) Square screw

LACQUER — black, clear, cobalt blue, ivory, medium green, red, thinner, white, and yellow

LUMBER — Ash, balsa, bass, birch, cherry, cypress, locust, mahogany, maple, oak, poplar, red cedar, red gum, redwood, sap gum, yellow pine, walnut, white pine
In ordering pine, mill run, kiln dried will be found suitable for carpentry, while short, select, kiln dried, 4 in. and wider or No. 1 shop common, kiln dried will be required for cabinetmaking and patternmaking
Hardwood, for furniture, should be specified first and second grade, kiln dried, standard widths and lengths, or short lengths

MOLDINGS

NAILS
- *a*) Common, 6d, 8d, and 10d
- *b*) Flathead, 1/2 in. No. 20, 3/4 in. No. 19, 1 in. No. 18, 1 1/4 in. and 1 1/2 in. No. 16, and 2 in. No. 14
- *c*) Finishing, 4d, 6d, and 8d

OIL
- *a*) Linseed, boiled
- *b*) Linseed, raw
- *c*) Machine
- *d*) Rubbing

OVERLAY CARVINGS

PANEL OR PLYWOOD — 3 ply, 5 ply, and 7 ply

PATTERN LETTERS

PINS — escutcheon

PUMICE STONE — No. 0

RAPPING PLATES

ROTTENSTONE

SANDPAPER — Garnet cabinet paper, 3/0, 2/0, 0, 1/2, 1
Garnet finishing paper, 6/0, 4/0
Garnet paper can also be obtained in rolls of 50 yd. in widths 4 in. up to 48 in. Narrower widths on special order

SCREW EYES

SCREWS
- *a*) Flathead, brass, No. 3 by 3/8 in., No. 4 by 1/2 in., No. 5 by 5/8 in., No. 5 by 3/4 in., No. 6 by 3/4 in., No. 7 by 3/8 in., No. 8 by 1 in., No. 10 by 1 1/4 in., No. 10 by 1 1/2 in., No. 12 by 1 3/4 in., No. 10 by 2 in.
- *b*) Flathead, bright, No. 3 by 1/2 in., No. 4 by 1/2 in., No. 6 by 3/4 in., No. 7 by 3/8 in., No. 8 by 1 in., No. 10 by 1 in., No. 8 by 1 1/4 in., No. 10 by 1 1/4 in., No. 14 by 1 1/4 in., No. 10 by 1 1/2 in., No. 12 by 1 1/2 in., No. 10 by 1 3/4 in., No. 12 by 1 3/4 in., No. 10 by 2 in., No. 12 by 2 in., No. 14 by 2 in., No. 12 by 2 1/4 in., No. 14 by 2 1/4 in., No. 14 by 2 1/2 in.
- *c*) Oval head, brass, No. 5 by 3/4 in., No. 6 by 3/4 in., No. 7 by 7/8 in., No. 8 by 1 in., and No. 10 by 1 1/4 in.
- *d*) Roundhead, blued, No. 3 by 3/8 in., No. 3 by 1/2 in., No. 5 by 3/4 in., No. 6 by 3/4 in., No. 7 by 7/8 in., No. 8 by 1 in., No. 10 by 1 1/4 in., No. 10 by 1 1/2 in., No. 12 by 1 1/2 in.
- *e*) Roundhead, brass, No. 3 by 3/8 in., No. 4 by 1/2 in., No. 4 by 5/8 in., No. 5 by 3/4 in.

SHELLAC
- *a*) Orange, cut 4 lb. to the gal.
- *b*) Sticks, assorted colors
- *c*) White, cut 4 lb. to the gal.

NOTE: Shellac should be kept in glass or earthenware containers

STAINS — oil, spirit, or water. Fumed oak, dark oak, golden oak, light oak, mahogany, and walnut

STEEL WOOL — No. 0 and No. 2/0

TURPENTINE

TWINE

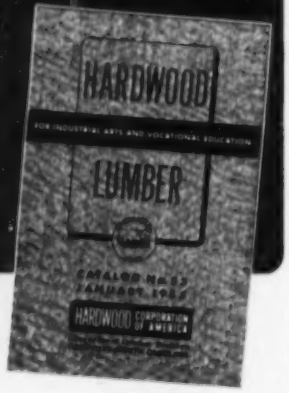
VARNISH — coach, flat, remover, spar, and rubbing

WASTE — cotton, white

WAX — bees and finishing

WHITE LEAD

NEW 1953 CATALOG NOW READY



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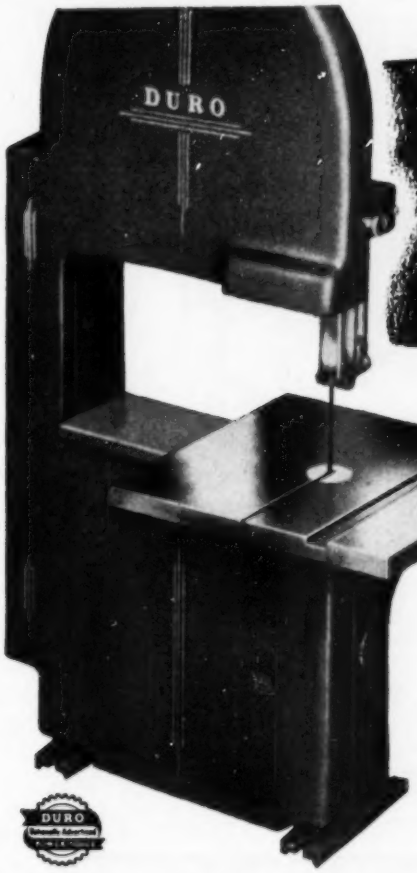

The Band Saw you NEED in YOUR shop!

New DURO 15" model offers a capacity to handle large work with greater dependability and accuracy

This 15" heavy duty Band Saw is an outstanding Duro development. Solid, precision built for years of quiet, efficient service, it will "cut corners" and costs on many woodworking operations. Only Duro offers these outstanding features: Sturdy cast iron, one-piece frame construction includes heavy ribs that give a solid, vibration-free foundation; ball bearing blade guides above and below table keep blade running truer and smoother; double trunnion table supports; balanced disc wheels; roller type bearings. Work table tilts to 45°; has built-in light; one-piece guard covers both wheels; unlocks easily, allows operator to check blade tension and tracking quickly, safely. Also permits easier blade changing. Can be used for metal cutting with special converter. There's a Duro Band Saw for every purpose in 10", 12", 15", and 16" models.

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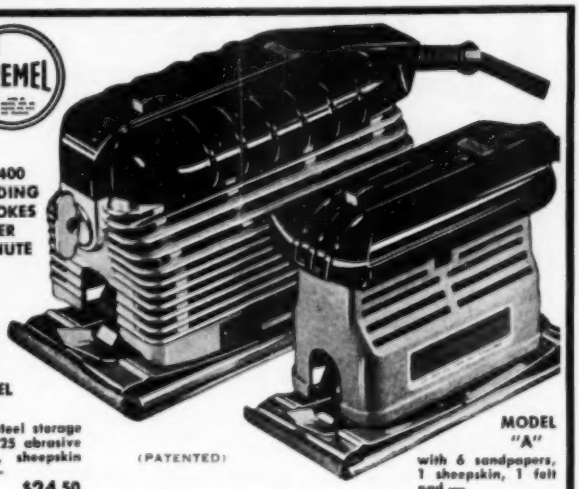
For the beginner or advanced craftsman. Refreshingly new material — with photographs, plan drawings, step-by-step instructions that anyone can follow easily. Send 35¢ for sample copy or you can save 30% and get 6 issues for only $1.50. Either way we'll refund your money if not satisfied. Write today!

DREMEL



14,400 SANDING STROKES PER MINUTE

MODEL 2000
with steel storage case, 25 abrasive sheets, sheepskin pad — **$24.50**

(PATENTED)

MODEL "A"
with 6 sandpapers, 1 sheepskin, 1 felt pad — **$14.85**

FOR FASTER, SCRATCH-FREE SANDING...USE DREMEL *STRAIGHT-LINE ACTION* SANDERS

● Both of these Dremel *straight-line* action sanders are ruggedly constructed — ideal for student use — Model 2000 for any type woodworking assignment, including desk refinishing, general school maintenance — Model "A" for lighter projects. Each model has only 2 moving parts — requires no oiling or attention — uses 110-120 V., 60 cycle A.C. Model 2000 has 21 sq. in. sanding surface, weighs 5 lbs. Model "A" has 12 sq. in. sanding surface, weighs 2½ lbs. *Both are excellent polishers.* Dremel Sanders are precision tools widely used in schools, home workshops, and industry. Fully guaranteed. *If your dealer can't supply, order direct.* WRITE FOR COMPLETE TOOL CATALOG.

DREMEL MANUFACTURING CO. Dept. 313-C RACINE, WIS.

"YANKEE" Spiral Drivers & Push Drills
TEACH MOTION-SAVING

Help students do better work with fewer motions. Just a simple push with a "Yankee" Spiral Screw Driver spins the blade and drives the screw. No heavy wrist work! A flick of the shifter gives driving or drawing action, or sets spiral rigid. Pilot holes made easily with a "Yankee" Automatic Push Drill. Spring brings back handle after every push; reverse-spins drill point to clear out chips. Magazine handle holds 8 points, 1/16" to 11/64". Write for free "Yankee" Tool Book.

No. 130A Spiral Driver

No. 41 Push Drill

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

IF it's Shop Class

you're teaching, you'll want to see these three outstanding texts —

BASIC PRINCIPLES OF SHEET METAL WORK

Soon to be Published! A thorough foundation in sheet metal work, valuable to student and mechanic alike. All procedures basic to the field are vividly pictured, with reading material kept to a minimum. The student actually sees how every operation is done — and sees every tool used in the process. Simple and clear, the text is ideally suited for students of all aptitudes.

BASIC WELDING PRINCIPLES

Published in February, this complete basic welding texts presents illustrations and detailed tool descriptions for all welding procedures. Checked against recommendations of the American Welding Society, all material has been tested for accuracy and teachability by industrial and governmental agencies. Glossary of terms . . . chapter summary reviews . . . progressive practice exercises . . . combine to form a compact, informative text. Approx. 224 pp.

Both by EMANUELE STIERI

MECHANICAL DRAFTING ESSENTIALS

Widely used and acclaimed, this combination text and workbook introduces all fundamentals of drafting — blueprint reading, technical sketching, mechanical drawing — each phase made easily understandable to the beginning student. Each unit is followed immediately by worksheets for the application of principles covered. Primary emphasis is placed on reading, interpreting, and sketching so the student obtains a solid foundation. 196 pp.

by WALTER E. FARNHAM and FRANCIS T. McCABE

OR if it's English Class

you teach . . .

SEE WHAT YOU SAY

Enthusiastically praised by teachers all over the country! Here is grammar, spelling, punctuation and usage of the English language presented pictorially. Class-tested, the text stimulates keen interest through effective drawings, depicting various parts of speech and application of grammatical rules.

Easy to read, easy to learn, easy to remember, SEE WHAT YOU SAY is one of the first books to apply visual techniques to the study of English. Equally well-suited for use as both a basic or supplementary text. 320 pp.

by BRUCE ALLYN FINDLAY and ESTHER BLAIR FINDLAY

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Educational Book Division

PRENTICE-HALL, INC.

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No. 52-52 Woodworking Bench

WITHSTANDS RUGGED SCHOOL SHOP USE

Picture your shop equipped with an installation of these durable, four-position Woodworking Benches. Overall size is 52" long, 52" deep, 31¼" high. Smooth, 2¼" thick maple top is supported by heavy pressed steel bench legs. Top is equipped with four vises, stops, and dogs.

Send for Industrial Arts Equipment Catalog

There's a PARENT equipment piece for every vocational application, including Machine Shops, Metal Shops, Electrical Shops. **Send for FREE catalog TODAY!**

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REDUCE COSTS ON "SMALL-WORK" GRINDING & FINISHING JOBS with

Foredom FLEXIBLE SHAFT MACHINES

YOU GET ALL these features superior

- Feather-weight, finger-tip-controlled handpiece (pencil size or larger) which eliminates operator fatigue.
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also flexible shaft tools attachable to your own drill press or motor

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FOREDOM ELECTRIC CO., DEPT. 6927S, 27 PARK PLACE, N.Y. 7, N.Y

BASIC VOCABULARY FOR AUTO MECHANICS

(Continued from page 62A)

relating the spelling, meaning, and use to the particular area under consideration. Teachers should also utilize kinesthetic approach much more widely with nonacademic minded groups than they do. This involves the tracing of the word with the finger which not only furnishes valuable kinesthetic training but also encourages desirable left to right eye movements. The tracing with the finger of words that have been written large with a pencil or crayon is a valuable exercise. Saying the letters of the word during the tracing should be encouraged. Writing words and spelling them orally at the same time is an excellent device.

Guessing in relation to the meaning of words should be discouraged by encouraging the use of the dictionary when there is doubt about the spelling, meaning, abbreviation, or syllabication of a word. In the related area, both standard dictionaries and *Crispin's Dictionary of Technical Terms* (The Bruce Publishing Company) should be available for the use of students. Instruction that will facilitate the use of the dictionary should start early and proceed systematically.

A

accelerator
advancing spark
air cleaner
ammeter
ampere
antifreeze
appearance
armature, generator

B

battery
battery acid
battery charge
bearings
bleeding
brake drum
brake fluid
brakes, hydraulic
brake pedal
brake shoe
breaker arm
brushes, starting motor
bumper

C

cable, battery
camber of wheels
camshaft
carburetor
carburetor choke valve
carburetor, dual
caster of wheels
cells, battery
chain, tire
choke, automatic
circuit breaker
clutch
clutch pedal
combustion chamber
commutator
condenser
cooling system
corrosion
crankcase
crankcase ventilator
crankshaft
cutout relay
cylinder
cylinder block
cylinder head

D

dents
diaphragm
dipstick
dismounting
distilled water
distributor
drain cock
drive
drive, Bendix
driving

E

electrical circuit
electrolyte
engine
engine cycle
exhaust
exhaust-manifold heat control
exhaust system

F

fan
fan belt
filter
filter bowl
filter, fuel
filter, oil
finish
flywheel
frame
frozen cooling system
fuel
fuel gauge
fuel line
fuel pump
fuel strainer
fuel system
fuel tank
fuse

G

galloping
galloping engine
gasket
gasket, fuel pump
gasoline
gasoline cap
gasoline gauge
gasoline tank
gear
gear, high
gear, low
gear, reverse
gear, second
gear shift lever
generator

(Continued on next page)

Arts & Crafts Special!

Here's an item that stimulates the creative talents of your industrial arts class—gives students a handsome, individually designed desk set for gift or personal use.

We furnish:

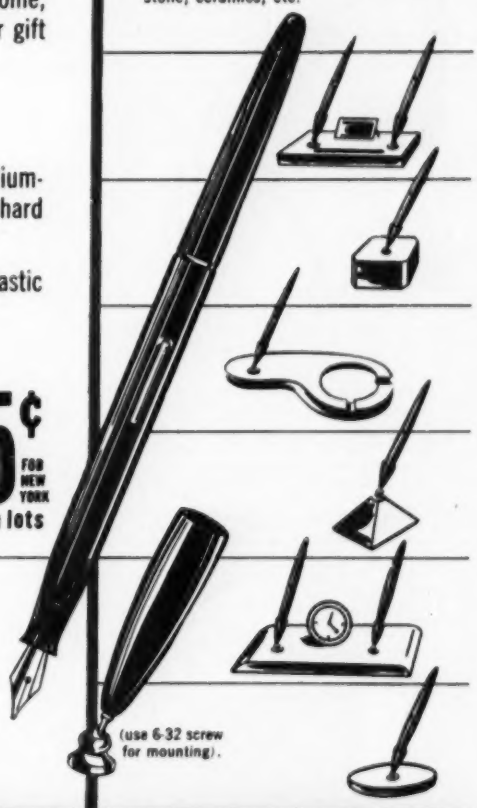
1. Guaranteed, high-quality iridium-tipped fountain desk pen with hard rubber feed and section.
2. Stream-lined, molded black plastic funnel.
3. Gold-plated swivel

Retail Value $1.50

all 3 for 45¢ FOR NEW YORK in dozen lots

Send $2 for 4 samples of No. 26R illustrated. Other pen and funnel combinations from 35c to $1.75.

BELOW—Some of the many designs that can be made out of leather, plastic, lucite, wood, metal, marble, onyx, clay, stone, ceramics, etc.

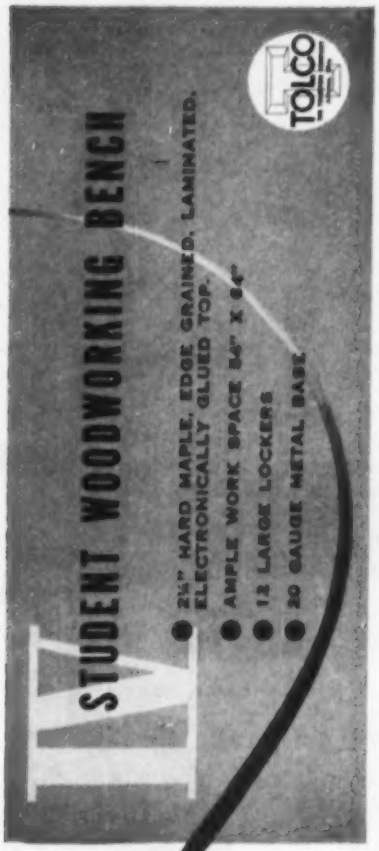


(use 6-32 screw for mounting).

MEMBER

Gilbert & Miller, inc.
PEN MAKERS TO THE TRADE SINCE 1927

693 BROADWAY, N. Y. 12, N. Y.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STUDENT WOODWORKING BENCH
2¼" HARD MAPLE, EDGE GRAINED, LAMINATED, ELECTRONICALLY GLUED TOP.
AMPLE WORK SPACE 54" X 24"
12 LARGE LOCKERS
20 GAUGE METAL BASE

YOUR SHOP WILL BE BETTER EQUIPPED TODAY, AND FOR YEARS TO COME, IF YOU SPECIFY TOLCO.

THE BASIC TOLCO LINE INCLUDES 12 MODELS WITH MANY POSSIBLE VARIATIONS. THERE IS A TOLCO MODEL TO FIT EVERY REQUIREMENT OF SPACE, STUDENT REQUIREMENTS AND BUDGET.

WRITE FOR OUR NEW ILLUSTRATED LEAFLET.

THE TOLERTON COMPANY

264 N. FREEDOM AVE.

ALLIANCE, OHIO

BASIC VOCABULARY FOR AUTO MECHANICS

(Continued from previous page)

H

heater
high voltage
horn
hydrometer

I

idle
idle adjustment
ignition
ignition coil
ignition switch
ignition system
impellers
impellers, water pump
inner tube
insulation
intake manifold

J

jacks

L

lamps
lead sulphate
leak, carburetor
leak, engine block
leak, fuel pipe
leak, manifold gasket
leak, oil line
leak, radiator
leak, water hose
leak, water pump
leak, windshield wiper tube
leaks
lights
lubrication
lubrication, chassis

M

master cylinder
missing
missing cylinder

N

needle
needle valve
noises

O

oil
oil filter
oiling system
oil level
oil lines
oil pan
oil pressure
oil pressure gauge
oil pressure regulator
oil pump
oil screen
overchoking
overcooling
overheating
overinflation

P

packing
packing rings
panel
panel, dash
panel, instrument
parking
patching
patching tubes
"ping"
pistons
plates
plates, battery
plates, negative
plates, positive
plugs
points
points, distributor
posts, battery
propeller shaft

R

radiator
regulator
regulator, automatic generator
regulator, oil pressure
regulator, voltage
reverse
road scum
rocker arm, fuel pump
rotation
rotors
rust
rust prevention

S

scratches
seizing
seizing of engine parts
shimmy, wheel
shock absorbers
sludge
spark
spark plugs
specific gravity
speedometer
springs
starter
starter button
starter gear
starting
starting motor
starting system
steering
steering mechanism
steering system
stroke
stroke, compression
stroke, intake
stroke, power
sulphuric acid
suspension system of front wheels
switch
switch, light
switch, starter

T

temperature
temperature, gauge
terminals
terminals, electrical
thermostat
timing
timing of spark
tires
tire valve
toe-in
traction
traffic
traffic film
tramp, wheels
transmission

U

upholstery

V

vacuum booster
vacuum chamber
valve
valves, exhaust
valves, intake
vapor
vapor lock
vent
vent hole
voltage

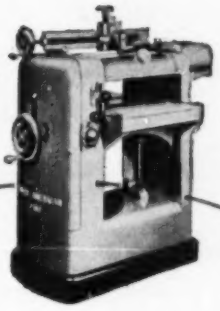
W

wander, wheel
water hose
water jacket
water passages
water pump
wheels
windshield
windshield wiper

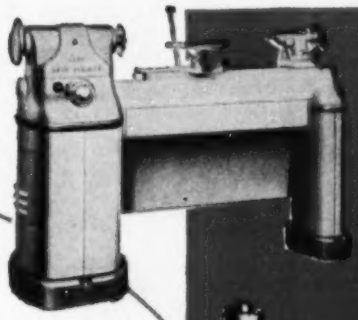
The fact that young drivers were involved in a smaller percentage of non-fatal wrecks is no consolation. To the contrary, it reveals the nature of your driving mistakes: excessive speed and recklessness. These are the errors that lead to head-on collisions and the violent crashes from which there is no escape.

Nearly 12,000 drivers your age took their own lives or the lives of others in 1950. The records show that in the heavy majority of cases, the driver was irresponsible, or inept, or both.

Be honest with yourself: are you mature enough to abide by *all* the rules of the road? If you are not, you cannot be trusted with a car. And you are headed for trouble if you drive. — ***The Travelers Insurance Co.***



J-180
18" x 6" SURFACER
Direct motor driven, 5 hp. motor. Vee-belt variable feed. 15 to 45 f.p.m. Top infeed roll is sectional. Flexible chipbreaker. Four knife round safety cutterhead. Cast-iron base and frame.



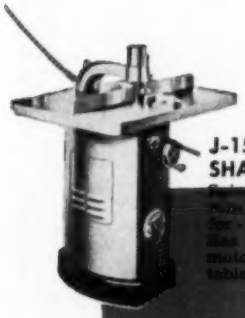
J-170
12" LATHE
Variable speed drive provides 700 to 3200 r.p.m. Available for wood turning, metal spinning or both. 58" bed. 21" between centers. Swing, 12"; 14½" over bed.

J-140
MORTISER
Direct motor driven. Foot-operated ram. Compound table—20" x 6". Has 11¾" lateral movement, 4" cross adjustment, 18" vertical adjustment.

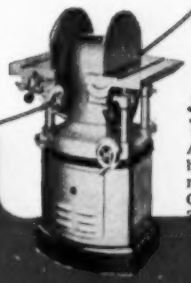
select Woodworking Machines you need FROM THE NEW J-LINE

The completely new Yates-American J-Line machines are as modern in design as they are attractive in appearance. They are ideal for school shops because of their sturdiness, safety and simplicity. Examine them — note the many design features that make them outstanding in their size and capacity range. Write for more information and for the name of your distributor.

J-120
20"
BAND SAW
Wheels 30" dia., 1⅛" face. Wheel speed 475 r.p.m., blade travel 4580 f.p.m. Table 24" x 24", tilts 45° right and 12° left. Stock: widest, 19½", opening under guide, 13½". 1 hp. motor, vee-belt drive.

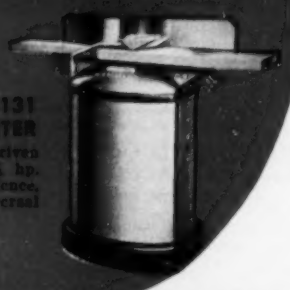


J-150
SHAPER
Spindle 1¼" diameter, alloy steel, ground and lapped. Runs in four sealed-for-life precision ball bearings. Has 3" vertical adjustment. 2 hp. motor, vee-belt drive, 30" x 36" table.



J-14
16" DISC SANDER
Available with single or double disc. Vee-belt drive. 3¼ hp. motor with double disc machine. ½ hp. motor with single disc. Counterbalanced table, 8½" x 20¾". Tilts 30° up and 45° down.

J-145
SPINDLE SANDER
Oscillates ½", 90 times per minute. Detachable spindle, coupled directly to ½ hp. motor. Table 20" x 24" tilts 45° left and 10° right.



J-131
8" JOINTER
Three knife round cutterhead is driven at 4300 r.p.m. by vee belts from ¾ hp. motor. Table 50" long. Cast iron fence, 3" high, 36" long, tilts 45°. Universal aluminum guard.

Yates-American
MACHINE COMPANY—Beloit, Wisconsin

Branch Offices
High Point, North Carolina
Memphis, Tennessee
Portland, Oregon

MATCHERS • BAND RESAWS • SANDERS • SURFACERS • CIRCULAR RIPSAWS • HEADS AND KNIVES

Print-Shop Equipment

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

BELLOWS
- *a)* Hand, small size
- *b)* Electric, blower type

BLACKBOARD — permanent or portable

BOOKCASE — for reference books, catalogs, etc., sectional preferable

BRAYER — 6 or 8 in. for proofing

BRUSHES
- *a)* Bench
- *b)* Benzine, No. 1, oval black
- *c)* Floor
- *d)* Padding, 1½ in. wide

BULLETIN BOARD

CABINETS
- *a)* Galley, for double column, wood or steel, four tiers (to be used with typesetting machines)
- *b)* Galley, for 8¾ in. by 13 in. galleys, wood or steel, four tiers
- *c)* Ink and roller, to accommodate platen-press rollers, wood or steel
- *d)* Matrix, for use with typesetting machines only
- *e)* Roller, cabinet or rack for cylinder rollers
- *f)* Supply, for leads, slugs, spaces, strip material, with top for lead cutter and mitering machine
- *g)* Type, school type, each to accommodate two California cases, job cases, case slides, galley slide, and copyholder
- *h)* Type, complete with 24 full-size California job cases, with overhead lead-and-slug cases, wood
- *i)* Type, complete with 24 full-size California job cases, double work bank, wood or steel
- *k)* Wood or metal, for filing class records, instruction sheets, etc.
- *l)* Storage for cuts

CANS
- *a)* Benzine, pint size
- *b)* Benzine, 5-gal. size
- *c)* Kerosene, safety, 1-gal. size
- *d)* Waste can, fireproof, for rags

CASES
- *a)* Blank, full-size, to accommodate ¼-size cases
- *b)* Border, ¼ size, for ornamental borders
- *c)* Lead and slug, regular size, to hold laborsaving fonts of leads and slugs
- *d)* Metal furniture, to hold laborsaving fonts
- *e)* Rule, ¼ size, for brass rule

CHAIRS — teacher's and tablet arm

CHASE RACKS
- *a)* For platen presses
- *b)* For cylinder presses

CHASES
- *a)* For each size of platen press
- *b)* For cylinder press

COMPOSING STICKS — 6 by 2 in., 8 by 2 in., 12 by 2 in., and 18 by 2 in., adjustable

CUTTER
- *a)* Lead and rule
- *b)* Paper, lever type, 20 in., with pedestal. Should handle 20 by 26-in. sheet
- *c)* Paper, lever type, 26 in. or 30 in.
- *d)* Paper, lever type, 30 in., with divided back gauge
- *e)* 30 in. to 36 in. power cutter

DESK
- *a)* Bindery, 80 by 36 in.
- *b)* Drying rack
- *c)* Imposing, 51 by 39 in.
- *d)* Make-ready, 32 by 24 in.
- *e)* Paper cutters, 80 by 36 in.
- *f)* Proofreaders
- *g)* Teacher's

DRYING RACKS
- *a)* Combination drying rack and stock table for platen presses, 30 trays
- *b)* Trays, interlocking, for cylinder press

FOLDING BONES — for hand folding

FOLDING MACHINE — 20 by 26-in. size, 4 fold, two parallel and two right-angle folds, power

FURNITURE — iron, 2 by 4 to 10 by 15 picas

GALLEYS — Steel, 8¾ by 13 in., 6¼ by 23½ in., double column, and 12 by 18 in.

GAUGE PINS — spring tongue

GLUE POT — electric, 1-qt. size

IMPOSING TABLES
- *a)* 12 by 18 in., with iron top, including reglets and furniture
- *b)* 24 by 36 in., with iron top, complete with galley slides, chase rack, reglets, and furniture
- *c)* 36 by 48 in., with iron top, complete with galley slides, chase rack, reglets, and furniture
- *d)* 39 by 63 in., with iron top, complete with drawers, letter boards, reglets, and furniture

INK FOUNTAINS
- *a)* Short, for 8 by 12, 10 by 15, and 12 by 18 presses
- *b)* Long, for 10 by 15, and 12 by 18 presses

KNIVES
- *a)* Overlay, for make ready
- *b)* Ink, 6 in. and 8 in.
- *c)* Ink, 8 in., square end

LEADER BOXES

LEADERS
- *a)* 6, 8, and 10 pt., fine dot
- *b)* 8 and 10 pt., hyphen

LINE GAUGES
- *a)* Metal, brass, or steel
- *b)* Wood

MALLET

METAL FURNACE — for recasting and refining type metal, used only with typesetting machines

MITERING MACHINE

NUMBERING MACHINES
- *a)* For use on presses
- *b)* Hand machines

ORNAMENTS
- *a)* Assorted floral and decorative designs
- *b)* Border, 6 and 12 pt., decorative

PAPER-DRILLING MACHINE

PERFORATOR
- *a)* 24 in., foot treadle
- *b)* 28 in., foot treadle

PLANER
- *a)* Mallets, hickory or fiber
- *b)* Proof, maple, with felt bottom
- *c)* Type, maple with leather top

PRESSES
- *a)* Cylinder, two revolution, four roller, 17 by 22, complete with variable-speed motor, cast rollers, etc.
- *b)* Platen, 8 by 12, with foot treadle, counter, flywheel guard, platen guard, brake, and set of cast rollers (motor and treadle combination if desired)
- *c)* Platen, 10 by 15, complete with variable-speed motor, counter, flywheel guard, brake, and set of cast rollers, etc.
- *d)* Platen, 12 by 18, complete with variable-speed motor, counter, flywheel guard, platen guard, brake, and set of cast rollers, etc.
- *e)* Proof, 14 by 18, with cabinet
- *f)* Proof, 20 by 24, with cabinet
- *g)* Proof, 23 by 24½, with cabinet
- *h)* Tableting

PUNCH
- *a)* Foot power, multiple with assorted punches
- *b)* Lever, two die, with assorted punches
- *c)* Power, multiple, with assorted punches (paper drill may be substituted)

QUOINS
- *a)* Sizes No. 1 and No. 2
- *b)* Keys, Sizes No. 1 and No. 2

RULE — plain and brass (fonts to fit quarter cases)
- *a)* 2 pt., laborsaving, hair line, side face
- *b)* 2 pt., laborsaving, 1 pt. side face
- *c)* 1 pt., laborsaving, 1 pt. face
- *d)* 2 pt., laborsaving, double face

SAW TRIMMERS — pedestal type, with point gauge, and raising and lowering table

SILK-SCREEN UNIT

SPACING MATERIAL
- *a)* Iron furniture, as selected
- *b)* Leads, laborsaving, 2 pt.
- *c)* Leads, 2-ft. strips, 2 pt.
- *d)* Slugs, laborsaving, 6 pt.
- *e)* Slugs, 2-ft. strips, 6 pt.
- *f)* Spaces and quads
- *g)* Thin spaces, brass and copper, assorted sizes, 6 to 8 pt., one size in each box

SPECIMEN DISPLAY BOARD

STAPLE BINDER — pedestal type, foot power

STEREOTYPING UNIT, 8 by 12 in.

STITCHER — wire, power, capacity ½ in. or ¾ in., flat- and saddle-back tables

TWEEZERS — 3½ in.

TYMPAN PAPER (with combination holder and cutter)
- *a)* 18 in.
- *b)* 38 in., upright, to be used with cylinder press only

TYPE
- *a)* Body, lightface — 8 and 10 pt.
- *b)* Job lightface — 6, 8, 10, 12, 14, 18, 24, 30, 36, and 48 pt.
- *c)* Job, lightface italics — 8, 10, 12, 14, 18, 24, and 36 pt.
- *d)* Job, boldface — 6 and 8 pt., 12 pt., No. 26; 12 pt., No. 27; 12 pt., No. 28; 18 pt., No. 30
- *e)* Job, light copperplate Gothic — 6 pt., Nos. 1, 2, 3, 4; 12 pt., Nos. 5, 6, 7, 8
- *f)* Job, condensed title Gothic — 12, 18, 24, 36, 48, 60, and 72 pt.
- *g)* Job, text type — 10, 12, 14, 18, and 24 pt.
- *h)* Job, typewriter type — 12 pt. with spaces
- *i)* Job, boldface Italic — 8, 10, 12, 14, 18, 24, 30, and 36 pt.
- *k)* Job, heavy copperplate Gothic

(Continued on page 74A)

ASSOCIATION NEWS

(Continued from page 6A)

Clifford Luke, vice-president; and A. Donald Beattie, secretary-treasurer.

♦ New officers of the Ohio Vocational Association are: Mrs. Alice Keuster, president; Mary Spiker, vice-president; and Ralph Woodin, executive secretary.

♦ New officers of the Vermont Vocational Association for the year 1952–53 are: Rachael Dix, president; Henry L. Doll, secretary-treasurer; vice-presidents, Charles Clark, trade and industry; Fred Alexander, distributive education; Henry Ross, agriculture; Peter Mallet, guidance; Frederick Miller, industrial arts; and Elaine Plumley, home economics.

Since it was established in 1938, through 1952, the National Foundation for Infantile Paralysis has allocated more than $16,200,000 in March of Dimes funds to finance professional and public education. — *Public Relations Department, National Foundation for Infantile Paralysis.*

Personal News

DR. SCHILDKNECHT JOINS STEVENS INSTITUTE

Dr. Calvin E. Schildknecht, 42, expert in the field of plastics and synthetic fibers, has joined the faculty of Stevens Institute of Technology, Hoboken, N. J., as an associate professor in the Chemistry Department, according to an announce-

(Continued on page 78A)

ATF

Good School News

GRAPHIC ARTS—THE EDUCATIONAL FIELD WITH A FUTURE

American Type Founders, Department of Education, 200 Elmora Avenue, Elizabeth, New Jersey

DETROIT INTERMEDIATE SCHOOLS HAVE BROAD GRAPHIC ARTS PROGRAM

Established as part of educational system for many years

Graphic arts education has been an accepted part of the industrial arts program in the Detroit public schools for more than thirty-five years.

Seventeen of the Detroit junior high schools give graphic arts instruction to their eighth and ninth grade pupils.

In Detroit, every graphic arts department is equipped with type cabinets, two power presses, and a great variety of smaller equipment, so that each pupil may have as complete training in printing as is possible within the time allocated to this program.

Typography and actual press work are emphasized, and other phases of graphic arts are included as part of the regular instructional program.

Students redistributing foundry type as a part of their training in graphic arts at the Durfee Intermediate School, one of seventeen Detroit intermediate schools with complete graphic arts departments.

NEW DE ROOS Type Face

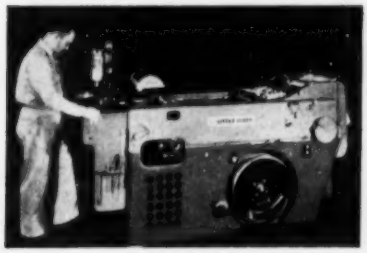
combines delicate beauty with all-around usefulness!

The new type face designed by the celebrated S. H. DeRoos is eminently graceful due to slender forms with full length ascenders and descenders. They are carefully balanced in color so that they print well on both rough and coated papers. If you desire a more complete showing, write for specimen folder.

Popularity of ATF Little Giant Presses for Graphic Arts Instruction Increases Rapidly

The recent installation of an ATF Little Giant press at the Essex County Vocational School, Newark, New Jersey, brought the total number of these 12x18 automatic cylinder presses now in use in the school field to 118.

They are now being used in the graphic arts departments of schools in thirty-four states.



The ATF Little Giant is an ideal press for student instruction because of its ease of operation, and the wide variety of work it can print. It introduces the student to the whole field of letterpress printing because it operates on the same principle as the Kelly and other larger presses.

Completely guarded, with no exposed reciprocating arms or levers, and having a large, easily accessible brake for immediate stops, the Little Giant is the safest press on the market today.

For students planning a future in the graphic arts, experience on the Little Giant 6 provides particularly valuable experience, since it is a press that is finding ever-increasing use in the industry.

ATF Information Aids Graphic Arts Industry

The Little Giant "Ten Strike" booklet is one of many publications ATF has prepared to aid the Graphic Arts Industry. With 16 photographs of Little Giant features, this booklet serves to thoroughly acquaint the reader with this particular press, and enables him to form a standard for comparing various presses of this size. ATF's Department of Education will be glad to furnish a copy of this booklet for use in your classes.

Consult ATF's Specialized Department of Education Engineering Service

ATF maintains specialized services for vocational and industrial schools.

We can assist you with your layout for a graphic arts department or shop, in outlining training courses, or finding competent instructors.

ATF also serves as a complete source of supply for equipment.

Call on us today. Write for your copy of ATF's booklet, "Career Opportunities in the Printing Industry."

(Continued from page 72A)

— 6 pt., Nos. 21, 22, 23, and 24; 12 pt., No. 25
l) Wood, condensed Gothic — 8, 12, 15, and 18 line
m) 10 pt. line leaders, 4 dots to the em
n) 10 pt. braces and dashes
o) 10 pt. fractions
p) 10 pt. references
q) Parentheses and brackets
r) 2 pt. laborsaving leads, 4 to 25 picas
s) 6 pt. laborsaving slugs, 4 to 25 picas
t) 2 pt. laborsaving brass rule
u) 2 pt. miters for rule
v) Laborsaving metal furniture
w) Thin spaces with quarter-size case

TYPESETTING MACHINES
a) Either linotype or intertype, 2 or 3 magazines, and molds
b) Matrices for same, 6, 8, 10, and 12 pt., as selected

VISUAL AID CHARTS

Print-Shop Supplies

BENZINE OR GASOLINE — for cleaning type or presses
BINDERY TAPE — 2 in. wide, brown or black
GOLD BRONZE — pale
INK
a) Bond, black, for bond papers
b) Book, black, for school papers, etc.
c) Cover, colors as selected
d) Dryers and compounds, as selected
e) Half tone, black
f) Job, colors as selected
g) Metallic, gold and silver
h) Process, black, red, yellow, blue

KEROSENE — for cleaning rollers
PADDING CEMENT
a) Cold
b) Hot

PAPER
a) Bond, fine grade, 17 by 22 — 20, white
b) Bond, medium grade, 17 by 22 — 20, white
c) Bond, sulphite, 17 by 22 — 20, white
d) Bond, sulphite, 17 by 22 — 20, colors as selected
e) Book, enamel, 25 by 38 — 80, white
f) Book, machine finish, 25 by 38 — 80, white
g) Book, eggshell finish, 25 by 38 — 60, white
h) Cover, as selected, 20 by 26, medium
i) Card Bristol, fine grade, 22 by 28 — 4 ply, white
k) Index Bristol, medium grade, 25½ by 30½ — 110, white
l) Index Bristol, medium grade, 25½ by 30½ — 140, white
m) Mill Bristol, medium grade, 25½ by 30½ — 140, colors as selected
n) Pressboard, red
o) Strawboard, No. 40 or No. 50
p) Tagboard, manila, 24 by 36 — 140
q) Tympan, to fit presses
r) Wrapping paper, size as selected
s) Holder for same

PASTE
a) Bindery
b) Make ready

SILK-SCREEN SUPPLIES consisting of:
a) Silk-screen process paste paint, 1 each of the following colors: toluidine red, strontian yellow, ultramarine blue, medium green, rich brown, orange, purple, white, and black
b) Solvent profilm in 11- by 14-in. sheets
c) 8-in. synthetic squeegee
d) 11-in. synthetic squeegee
e) No-clog varnish
f) Film solvent
g) Stencil filler
h) Filler remover
i) Stencil knife
k) Fiber guides
l) Red sable brush — ½ in.
m) Putty knife
n) Frame tape

TWINE — cotton, for tying jobs

WIRE STITCHING
a) No. 28 round wire for stitcher
b) Wire staples, ¼ in.

Drafting Equipment and Supplies

These maximum lists may be found helpful in checking inventories or preparing budgets.

If possible, each shop should have access to a projector, so that stills, silent movies, or sound movies, may be used also in the student's industrial arts and vocational education courses.

ADJUSTABLE-CURVE RULER
BEAM COMPASS
BENCH BRUSHES
BLACKBOARD
a) Permanent or portable
b) Compass, 15 in., with locking device
c) Drawing set: T square, straightedge, triangle, and protractor

BLUEPRINT
a) Frame or machine
b) Washing trays or washer
c) Paper tube, airtight
d) Drying rack or dryer

BOOKCASE
CABINET
a) For filing drawings

(Continued on page 76A)

it had to be HIGGINS INDIA INK!

Severe winters on the Italian front forced Ed Reep to turn to pen and ink. "Oils were not practical," he recalls, "because of slowness in drying, and watercolors actually froze on the board, only to melt away later. Ink worked! Yes, it was Higgins!"

In the masterly light and shade gradations of "Mortarmen," Reep uses this versatile medium for a full scale of values from pure white to solid black — and all the tones between.

But Higgins' versatility is nothing new to Reep. "Since art school days," he says, "I have used colored and black and white Higgins Drawing Ink, hardly considering the fact that there might be other brands on the market. Strong testimonial, but *true!*"

Mortarmen in the Idice River Valley *Edward A. Reep*

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EAGLE "CHEMI-SEALED" TURQUOISE DRAWING 6B

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What's more, the supremely fine particles of 100% "ELECTRONIC" graphite make a smoother, stronger, denser and more durable lead that takes and *holds* a needle point. TURQUOISE makes longer lines of uniform weight and perfect reproduction quality.

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Just drop us a note, naming the degrees you desire and the dealer who supplies you.

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(Continued from page 74A)

b) For storing drawing boards
c) For storing drawing instruments
d) For storing models

CALIPERS — 6 in. and 8 in., inside and outside
CHAIR — teacher's
DESK — teacher's
DIVIDERS — proportional
DRAFTING MACHINE — and accessories
DRAFTSMAN'S STEEL PROTRACTOR
DRAWING BOARDS — large
DRAWING-BOARD SUPPORTS — to be set on or attached to woodworker's bench
DRAWING TABLES AND STOOLS
a) For students
b) For teachers
INK-BOTTLE HOLDER
IRREGULAR CURVES — Nos. 17, 21, and 24, wood, rubber, or transparent
LETTERING ANGLES
LETTERING PENS — assortment of 12
LEVEL OR TRANSIT — builders' for architectural students
LEVELING ROD — for use with the transit
MACHINISTS' COMBINATION SET — 12 in.
MARKING PINS — for use with measuring tape, for architectural students
MICROMETER — 1 in., for mechanical-drafting students
OILSTONE — 3-in. case
PANTOGRAPH — 21 in.
PARALLEL RULES
PLANIMETERS
PLUMB BOB
SHEARS — for trimming blueprints and drawings
SPEED COUNTER — for mechanical-drafting students
STEEL SCALES — 12 in.
STOP WATCH — for mechanical-drafting students
TABLE
a) For cutting and trimming drawings and blueprints
b) For disassembling and reassembling machine parts and models
TAPELINE
a) 100 ft., steel, for architectural students
b) 50 ft., steel or metallic
TOOLBOX — containing 1 machinists' hammer, one 6-in. adjustable wrench, one 6-in. screw driver, one 6-in. combination pliers
TRIANGLES
a) 30-60 deg., 14 in. transparent
b) 45 deg., 10 in. transparent
TRIANGULAR SCALES — civil engineers' type, 12 in.
T SQUARE — adjustable or fixed head, for large drawing board or straightedge with parallel rule attachment for large drawing boards
WALL CHARTS — lettering, decimal equivalents, etc.
YARDSTICK

To be provided by, or for, each student

Drafting — Small Equipment

DRAWING BOARD — size to be specified by instructor
DRAWING INSTRUMENTS — as specified by instructor
ERASING SHIELD
IRREGULAR CURVE — Nos. 8 and 13, transparent
PENCIL COMPASS
PENHOLDER — for lettering pens
PENS — assorted, for lettering
PROTRACTOR — not over 5 in.
SCALE — 12 in. architects', triangular
SCALE GUARD
SLIDE RULE — 10 in., as specified by instructor
T SQUARE — to fit drawing board
TRIANGLES — 30-60 deg., 10 in. transparent, and 45 deg., 8 in. transparent

Drafting Supplies

BICHROMATE OF POTASH — crystals
BLUEPRINT
a) Paper, 36 in. wide
b) Writing fluid
PAPER
a) Cross section, 8½ by 11 in.
b) Detail, 24 by 36 in.
c) Drawing, 24 by 36 in.
d) Isometric, 7 by 10 in.
e) Tracing, 36 in.
POWDER — for tracing cloth
TRACING CLOTH — 36 in.
VAN DYKE
a) Fixing salts
b) Paper, 36 in.
c) Writing fluid

Drafting — Additional Supplies

To be provided by, or for, each student
ERASERS
a) Cleaning
b) Ink
c) Pencil
INK
a) Black, waterproof
b) Colored, if required
PENCILS — DRAWING, HB, 2H, 3H, 4H, and 6H
PENCIL POINTER PAD
THUMBTACKS OR SCOTCH TAPE

New BERGER drafting kit for students will make your teaching job easier... help your classes learn faster

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General Metals — *Feirer*

General Woodworking — *Groneman*

Automotive Mechanics, 2nd Edition — *Crouse*

Automotive Workbooks (5) — *Crouse*

Mechanical Drawing, 5th Edition — *French and Svensen*

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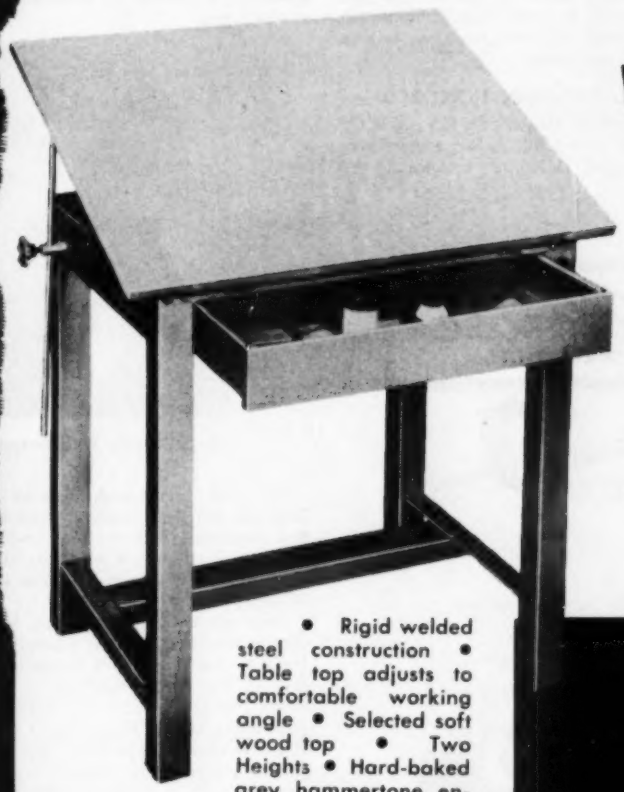

• Rigid welded steel construction • Table top adjusts to comfortable working angle • Selected soft wood top • Two Heights • Hard-baked grey hammertone enamel finish • 4 Board Sizes

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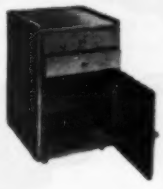
• Precision built • A neat, compact storage unit • Stores and protects bulky art work • Keeps paper from curling • Four and five drawer sections • Heavy gauge steel welded to form • Smooth rolling ball bearing drawers • All standard sizes • Ideal for school use

STACOR Life-Time Steel TABORETS



• Two drawers • Large cabinet section with door • Heavy gauge steel, welded to form • Recessed base or with casters for mobility

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PERSONAL NEWS

(Continued from page 72A)

ment by Jess H. Davis, president. Dr. Schildknecht will conduct a special graduate course in plastics and will also teach undergraduate courses.

After graduation from Gettysburg College, Pennsylvania, Dr. Schildknecht attended Johns Hopkins University, where he received the Ph.D. degree. After a brief period of teaching, he entered the Arlington, N. J., laboratory of E. I. du Pont de Nemours and Co., where he did fundamental and applications research in vinyl plastics.

In 1943 he joined the staff of the Central Research Laboratory of General Aniline and Film Corp., Easton, Pa., as a group leader in research on vinyl and other plastics. Later, he became assistant to the director of development for the same company.

From 1951 until he joined the Stevens staff, Dr. Schildknecht was engaged in plastics research for the Celenese Corporation, Summit, N. J.

The holder of some 15 patents in his field, Dr. Schildknecht has written extensively on plastics for technical and professional publications. He is the author of two books on the subject. His *Vinyl and Related Polymers* was published in 1952. Another book, *Polymer Processes*, is now in the hands of the printer.

CLYDE A. BOWMAN HONORED

The Stout Institute, Menomonie, Wis., certainly went way out to show Clyde A. Bowman, retiring dean who has served the Institute so faithfully for the past 33 years, their deep gratitude and respect at a testimonial dinner held at Menomonie at 6:30 p.m., on Saturday, January 10, 1953.

About 230 gathered to honor the retiring dean. The large gathering consisted of faculty members and students of The Stout Institute, citizens of Menomonie, and visiting friends from all parts of Wisconsin and the surrounding states.

Dr. William J. Micheels, professor of industrial education, University of Minnesota, was master of ceremonies.

Dean Clyde A. Bowman

Dr. Verne C. Fryklund, president of The Stout Institute, the first speaker, emphasized the fact that Bowman's work not only brought honor to The Stout Institute, but to the city of Menomonie, the state of Wisconsin, and the entire United States.

Other speakers were: Richard Duthler, president of the Stout Student Association, The Stout Institute; Ira O. Slocumb, citizen of Menomonie; Roy R. Van Duzee, president of the Wisconsin Association of Directors of Vocational and Adult Education; Alice J. Kirk, dean of the Division of Home Economics, The Stout Institute; John A. Jarvis, professor of industrial education, and successor of Dean Bowman at The Stout Institute.

The main address by Dr. William F. Rasche, director of the Milwaukee School of Vocational and Adult Education, then followed.

Dwight L. Agnew, associate professor of social science, The Stout Institute, gave a short talk for Stout after which Clyde A. Bowman, dean of the division of industrial education, made his response.

The entire program was kept on the friendly basis of an intimate family gathering, and showed plainly the fine feeling of friendship which faculty members, former and present students, fellow educators from far and near, and townspeople held for the quiet, modest dean who was about to bid adieu to the Institute which he had served so long and so well.

On Saturday, January 17, 1953, the Milwaukee Industrial Arts Teachers' Association staged their testimonial dinner at 6:30 p.m., at Sieker Hall, in the Milwaukee Vocational and Adult Schools.

George Shepherd, president, Milwaukee Industrial Arts Teachers' Association, welcomed those who had assembled, and Truman Atwell took over the duties of the master of ceremonies.

Roy Van Duzee, director, West Allis Vocational School, then spoke for the Milwaukee suburban schools.

Harlan Shufelt, director of industrial arts, Racine public schools, represented the Wisconsin Industrial Arts Teachers' Association, and lauded Bowman's work in that organization.

(Continued on page 81A)

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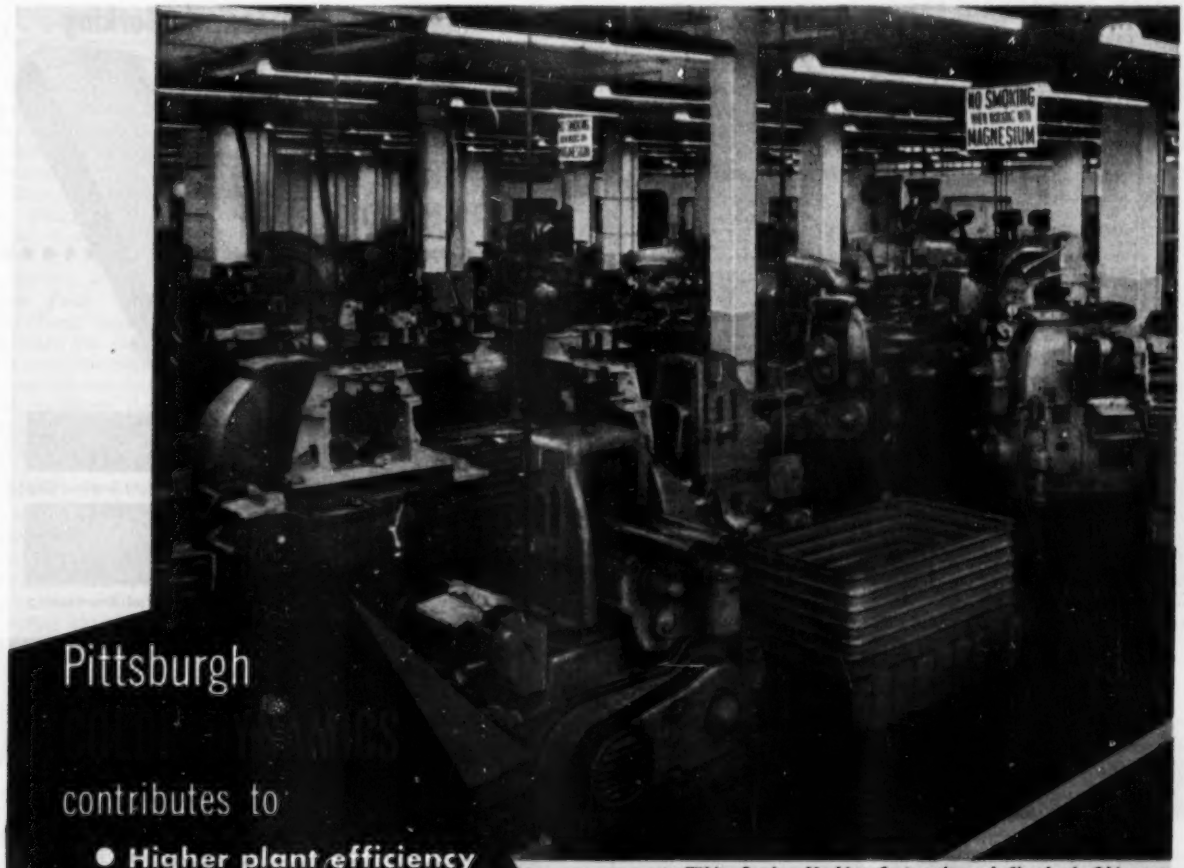

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● **COLOR DYNAMICS** is a scientific painting method based upon the simple reaction of human beings to color. Tests have shown that some colors stimulate, others are restful, still others depress—even cause irritation and discomfort.

● ***Focal* colors** lessen eye fatigue and nervous tension. *Eye-rest* colors relax the eyes of the worker. *Morale-building* colors promote cheerfulness and restrain mental depression. *Safety* colors lessen accident hazards.

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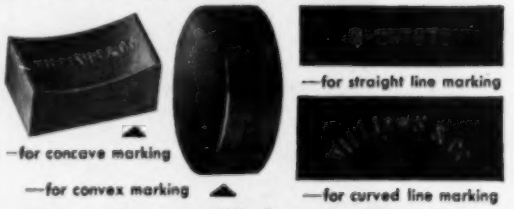

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—for curved line marking

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PERSONAL NEWS

(Continued from page 78A)

Dr. William F. Rasche, director, Milwaukee Vocational and Adult Schools, called attention to the Bowman influence in industrial arts and vocational education throughout Wisconsin and our entire country.

John Metz, editor of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, pointed out the effect which Bowman's writings had and still has in our field of education.

R. A. Radtke, director of industrial arts of the Milwaukee Public Schools, then spoke, after which the "Dean" responded.

Again, there was the homelike atmosphere, the feeling of good friendship, and the expressed hope that though distance might separate Dean Bowman and his friends, the bonds of amity would be maintained, and Bowman himself promised to visit us, but, as he emphasized, only in summer.

EMANUEL E. ERICSON HONORED

Emanuel E. Ericson came to America as an immigrant from Sweden having been born in Stockholm. Entering this country as an adolescent youth, he began his climb to fame and success by taking advantage of the free enterprise system of our democracy to enjoy the freedom of his own efforts.

Emanuel E. Ericson

His first accomplishment was to learn the language of our country and secondly, to complete four years of high school education in the short space of two years.

His biographical sketch follows:

Educational:

Graduate East Central Normal School, Ada, Okla.

B.S. Degree, The Stout Institute, Menomonie, Wis.
Major: Industrial Education
Minor: Economics

M.A. Degree, University of Southern California
Major: Education
Minors: Social Science, Foreign Language

Special work, U.C. Berkeley and University of Chicago

European Study and Travel, Survey of Schools, England and Sweden, 4 months

National Survey of Teacher Education in Industrial Arts (personal survey of 23 colleges and universities) fall, 1949, 3 months

Teaching and Educational Administration:

Director, Manual Arts, State Normal School, Ada, Okla., Industrial Arts and Social Science — 6 years

Supervisor, Industrial and Fine Arts, City Schools, Okmulgee, Okla. — 2 years

Director, Industrial Division, Santa Barbara State College — 1925–44
Also Director of Extension Service — 1928–44

Professor of Industrial Arts and Chairman, Department of Industrial Arts, University of California, Santa Barbara College, 1944–48

University Extension Representative, Santa Barbara, 1944–47

Professor of Industrial Arts and Assistant Director, University Extension, Central Coastal Area, 1947–

Summer Session faculty appointments: University of West Virginia; Bradley University, Peoria, Ill., Iowa State College, Ames, Iowa; Colorado State College of Education, Greeley, Colo.; Colorado State College, Fort Collins, Colo.; Texas Agricultural & Mechanical College, College Station, Tex.; Utah State College of Agriculture and Mechanic Arts, Logan, Utah; also summer lecture engagements at State Teachers Colleges of Kirksville and Springfield, Mo.

Also Summer 1952, The Stout Institute, Menomonie, Wis.

State Director, Model Aircraft Projects, California, 1942

Professional Contributions:

BOOKS

Glass and Glazing, 146 pp., illus. The Manual Arts Press, 1925

Teaching the Industrial Arts, 384 pp. The Manual Arts Press, 1946

(Continued on next page)

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PERSONAL NEWS

(Continued from previous page)

Teaching Problems in Industrial Arts, 433 pp. The Manual Arts Press, 1930

Planning Your Home: Coauthor, Roy L. Soules, 140 pp. The Manual Arts Press, 1938

BOOKS — COAUTHOR OR CONTRIBUTOR

Principles and Problems in Vocational Guidance, Contributor. McGraw-Hill Book Company, Inc., 1927

Mental Measurements Yearbook, Contributor. The Mental Measurements Yearbook, Highland Park, N. J., 1941

The Home Workshop, Contributor. Popular Science Publishing Company, 1930

What Our Schools Are Teaching, Contributor. Teachers College, Columbia University, 1941

Forty-fifth Yearbook, National Society for the Study of Education, Part 1, 1946

War Effort and Long-Term Program in California Secondary Schools, Contributor. 1942

BULLETINS AND MONOGRAPHS

The Vocational Schools of Sweden, trans. Published by the Vocational Education Association of the Middle West, 1924.

Standards of Attainment in Industrial Arts Teaching. Published by American Vocational Association, 4 revisions. Chairman of Committee, 1929–34.

MAGAZINE ARTICLES

Contributed about 200 magazine articles appearing in *American School Board Journal; Popular Science; American Vocational Education Journal; Sierra Educational News; Education; Industrial Education Magazine; Industrial Arts and Vocational Education Magazine; Administration and Supervision;* and *Journal of Engineering Education.*

Chairman, Industrial Arts Policies and Planning Committee, American Vocational Association

Chairman, Committee for *Guide-Book for Industrial Arts for California*, bulletin completed 1949

Member, Jury for Cooperative Study of Secondary School Standards, Washington, D. C., R. D. Mathews, Director, 1949

Represented California State Department of Education at National Life Adjustment Conference in Washington, October, 1949

Appointed member on Committee on Vocational Education, American Council of Education, for Educational Exchange Program under the Fulbright Act, Public Law 584. Appointment made — 1949

Member National Committee on Accreditation and Evaluative Criteria for Teacher Education in Industrial Arts, 1950

Industrial and Nonteaching:

Structural Drafting and Engineering, Building Construction & Contracting, 3 years

Assistant Editor, *Industrial Education Magazine*, 4 years

Faculty Committees since 1944:

Chairman, Standards Committee

Subcommittee Chairman, Committee for Divisional Reorganization of College

Member, Co-ordinating Academic Council

Member, Committee on Committees

Member, Space Committee

Member, Advisory Committee to Dean of Applied Arts

Member, Interim Committee on Rules and Jurisdiction

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His undying efforts have been devoted to the teaching of industrial arts as one of the practical arts and a part of general education having to do with tools, materials, and processes that are stimulating to our homes and the nation's manufacturers.

On January 8 in the El Cielito Restaurant, a meeting was held to give formal recognition to Mr. Ericson by presenting formally to him the Ship's Citation. This meeting was held under the auspices of the Santa Barbara-Ventura Section of the California Industrial Education Association. The president of this section of the California Industrial Education Association is a former student and colleague of Mr. Ericson's, Dr. Kermit A. Seefeld. The addresses of the evening were given by Dr. Edwin A. Lee, the first president of the American Vocational Association and a recipient of the Ship's Citation in 1940. Supporting the address of Dr. Lee was Dr. Howard A. Campion, associate professor of the University of California, on Dr. Lee's staff in the School of Education at UCLA, and associate superintendent of the Los Angeles public schools. Dr. Campion likewise received this citation in 1947. It is quite unique that the University of California has on its staff three of the eleven recipients of this high award, and we are proud of the fact that three of the eleven awards have been made to faculty members of our university. Furthermore, no other state has been so highly honored through such recognition of its personnel.

The presentation of the citation was made by Dr. Lynne C. Monroe, chairman of the department of industrial arts who received the citation for Mr. Ericson at Boston. — *Lynne C. Monroe, Chairman, Department of Industrial Arts.*

♦ LOUIS A. MCELROY, former assistant principal of the Emily Griffith Opportunity School in Denver, Colo., and past president of the Colorado Vocational Association, is now director of the Phoenix Technical School, Phoenix, Ariz.

♦ JAMES D. MATHISEN, former member of the University of North Dakota faculty, was appointed North Dakota State Supervisor of Guidance Services, effective August 1, 1952.

♦ EDWARD SMITH, who began teaching in 1917 at the Crockett, Tenn., Technical High School, was presented with a watch by his state associates last spring for 35 years of service to vocational education.

♦ EARL D. HEATH has been awarded a teaching fellowship at the New York University. He is currently on leave of absence from his duties with the staff of the board of education of Baltimore County, Md.

Mr. Heath received his B.S. degree from the State Teachers College at California, Pa., and his M.A. degree from the University of Maryland. He is presently a candidate for the Ph.D. degree in the area of safety education at the New York University.

♦ LAWRENCE M. FREDERICK has been appointed head of the industrial-arts department at New Mexico Western College, Silver City, N. Mex. He has been associate professor in charge of

(Continued on page 84A)

losing your sunny disposition?

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PERSONAL NEWS

(Continued from page 82A)

woodworking and drawing for the past three years.

♦ Dr. Kenneth C. Vincent has been appointed supervisor of extraction metallurgy at Armour Research Foundation of Illinois Institute of Technology.

Before joining the Foundation, Dr. Vincent was chief metallurgist for the Baroid Sales Division of the National Lead Co., Houston, Tex. He also has been associated with the U. S. Bureau of Mines in Salt Lake City, Utah, and the American Smelting and Refining Co., Garfield, Utah.

♦ Dr. George Gibson has been named acting chairman of the chemistry department at Illinois Institute of Technology during a nine-month leave of absence granted Dr. Martin Kilpatrick, Chairman.

Dr. Gibson is an associate professor of chemistry at Illinois Tech since 1942.

♦ Dr. H. Robert Kinker, associate professor of education, has succeeded to the chairmanship of the Department of Vocational Education and Guidance at Indiana University.

Dr. Kinker follows Dr. Melvin S. Lewis who headed the department for 22 years. Prior to coming to Indiana University three years ago Dr. Kinker was a trade and industrial teacher trainer with the University of Toledo for five years. Before that he taught automotive mechanics in both Ohio and New York.

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♦ Henry L. Doliber passed away November 28, 1952, after an extended illness. Mr. Doliber taught machine shop at Wilbur Wright School, Detroit, Mich.

♦ Dr. Ralph G. Owens, dean of engineering at Illinois Institute of Technology, has been named vice-chairman of the Illinois-Indiana section of the American Society for Engineering Education.

♦ Herbert N. McCulley will teach mathematics and industrial arts at West High School, Waterloo, Iowa.

♦ Robert Mahany, formerly teaching at Ottumwa, Iowa, has accepted a position as woodworking instructor at Roosevelt High School, Cedar Rapids, Iowa.

♦ Paul Buegel of Fort Dodge, has accepted a position at Dowling High School in Des Moines to teach industrial arts.

♦ Charles Freedin will be the industrial-arts teacher at Lone Rock, Iowa.

♦ Elmer Aurand has been named principal of the new Edwards Elementary School in Ames, Iowa. Mr. Aurand has been teaching metalwork and crafts in the Ames Junior and Senior High Schools the past four years.

♦ Durrell K. Knowles, formerly teacher of vocational auto mechanics at William Rogers High School, Tulsa, Okla., has been appointed teacher of day trade auto mechanics at High School East, Wichita, Kans.

♦ Walter Ramey, formerly industrial arts teacher at Perry, Iowa, has accepted the drawing position at Des Moines Technical School, Des Moines, Iowa.

♦ Gerald Bancroft, formerly of the Webster City Junior High School, has accepted a position as industrial-arts teacher in the Ottumwa, Iowa, public schools.

♦ Geo. F. Henry, University of Florida, Gainesville, Fla., is on a nine months' sabbatical leave from his position as head of the industrial-arts department, Colorado A. & M. College, Ft. Collins, Colo. He is enrolled in graduate courses under Dr. Walter R. Williams and Dr. Meyer in the industrial education department and in courses in the School of Education.

♦ William H. Etsweiler, Jr., general shop instructor at the Huntingdon High School, Huntingdon, Pa., since 1946, has returned to his position there after a two-year period of active duty with the United States Navy. During the time he was with the navy he served as damage control officer and assistant engineer aboard the *U.S.S. Duxbury Bay*, a seaplane tender and flagship of Commander Middle East Force. His travels provided him with many opportunities to observe firsthand the various arts and crafts indigenous to the Middle Eastern countries.

During Etsweiler's absence James Seitz taught the comprehensive general shop and has been retained to teach woodworking, plastics, and drawing. Mr. Etsweiler will teach in the general metals area which includes sheet metal, machine shop, and welding.

♦ Samuel Huston George was named "Master Teacher of 1952" by the Michigan Industrial Education Society.

He is the industrial arts instructor in the Reed City, Mich., High School, and has had 27 years of varied teaching experience. He designed and supervised the construction of the industrial arts building in Reed City.

♦ Herbert Anderson, formerly dean of the Los Angeles Trade Technical Junior College in California, and who surveyed graphic arts recently in Rio de Janeiro, has been assigned to the Domini-

(Continued on page 86A)

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Director of the Summer Session
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PERSONAL NEWS

(Continued from page 84A)

can Republic to assist in the organization of a new industrial training school.

♦ HARRY A. MINERT has been appointed state supervisor of trade and industrial education of Illinois. Prior to this appointment, he taught vocational drafting for eleven years at the Decatur Senior High School.

♦ LEROY BREWINGTON, assistant professor, Kansas State Teachers College, Pittsburg, Kans., has been presented with the Golden Key of Craftsmanship by the Greater Kansas City Printing House Craftsmen. This is in honor of his 25 years of service in preparing young people for the printing industry.

♦ MERVIN E. RUNNER, instructor of chemistry at Illinois Institute of Technology, has been promoted to the rank of assistant professor, effective September 1.

♦ DR. JESS E. RATHBUN, co-ordinator of industrial arts, San Francisco Schools and former editor of the *School Shop Safety News Letter*, taught a two-week workshop in shop safety at San Francisco State College from June 25 through July 3. Over thirty teachers from four western states were enrolled.

♦ DR. KENNETH W. BROWN, assistant director of fine and industrial arts of Philadelphia, and vice-president of the American Industrial Arts Association taught a two-week workshop in supervision and administration of industrial arts and a two-week workshop in laboratory planning at San Francisco State during July.

♦ WILLARD J. MCCARTHY, formerly industrial-arts instructor in the high school at Pulaski, Wis., has joined the teaching staff of the department of industrial arts at Murray State College, Murray, Ky.

♦ E. ROBERT RUDIGER has joined the staff of The Stout Institute. He will succeed John A. Jarvis when the latter takes over the position of dean of the division of industrial education of The Stout Institute.

Mr. Rudiger received both the bachelor's and master's degrees from The Stout Institute, and his doctor's degree in education from the University of Missouri.

Officers of the Ohio Industrial Arts Association, elected for 1952–53. Left to right they are: Willard Barnes, treasurer; Howard Shadle, secretary; Max Lerner, president; Ellis Mills, vice-president; and Mr. Bill Hisey of Goodyear

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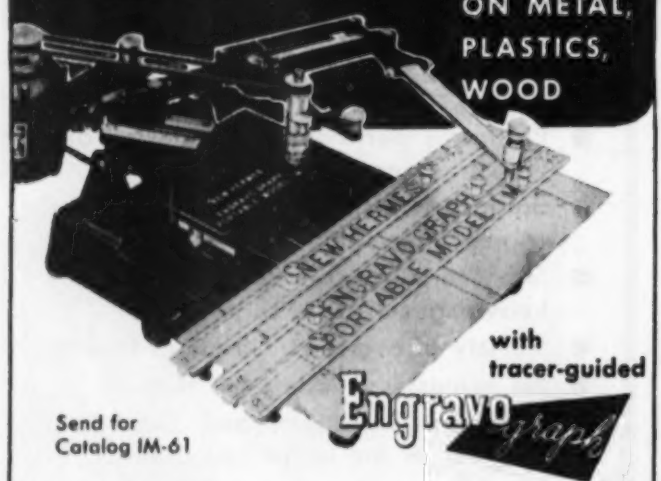

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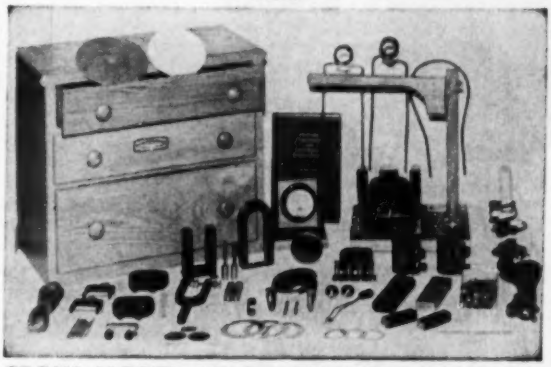

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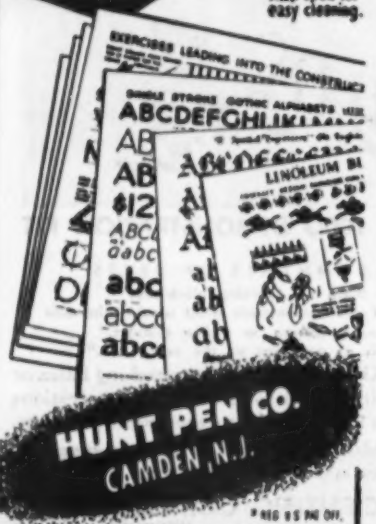

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News Notes

♦ The nation's leading picture-taking competition for high school students — the National High School Photographic Awards — opened this year on January 1 and will close on April 15, the National Scholastic Press Association has announced.

Two of the more important changes involve a shorter contest period, and a change from a single grand prize to four grand prizes. In the new prize structure, students winning first place in each of the contest's four classes will be declared grand prize winners and rewarded accordingly.

For full information about this competition write to NSPA National High School Photographic Awards, 18 Journalism Bldg., University of Minnesota, Minneapolis 14, Minn.

♦ The Rules and Conditions booklet for the $7,000 Arc Welding Award Program for high school students on farms and ranches is now available from the Lincoln Foundation, Cleveland 17, Ohio.

One hundred cash awards totaling $5,000 are offered to students for the best descriptions of how arc welding is or can be used in making and repairing farm equipment and tools.

♦ Telenews is making its "Weekly News Review" available for school use at a nominal rental charge.

"Weekly News Review" is specifically for use on TV. The weekly issues have been found very valuable in current events and civics studies. Each week's release is made up of news stories filmed in all parts of the world by Telenews camera staffs. Delivered on 16mm. film, each issue is in essence a carefully edited 15-minute summary of the international news highlights of the week.

Details may be obtained from *Richard Milbauer, Telenews Productions, Inc., 630 Ninth Ave., New York 36, N. Y.*

♦ Metallurgy that is measured in ounces instead of tons is featured in a new sound and color motion picture, *"Metallurgy in Miniature,"* which shows in documentary style how skilled metallurgists and scientists work to create the special alloys used in fine watches.

The dramatic story of *dynavar*, the new nonmagnetic, rustproof mainspring, is told in live action and animation, with sequences showing how the watchmaking industry has achieved self-reliance in the development of such alloys.

"Metallurgy in Miniature" takes the viewer behind the scenes for glimpses of the metallurgists exploring the mysteries of metals with their power microscopes and other intricate, precision instruments.

The film is presented by the Hamilton Watch Co., and is available on a free-loan basis from the regional libraries of Association Films, Inc., in Ridgefield, N. J. (Broad at Elm); Chicago (79 E. Adams St.); San Francisco (351 Turk St.); and Dallas (1915 Live Oak St.).

♦ Dravo Corporation, for the fourth year in a row, will sponsor two cash awards to stimulate participation in the School Science Fair, scheduled for the two weeks of April 18–May 3 in Buhl Planetarium.

The Fair, which is conducted jointly by the Planetarium and The Pittsburgh Press, is open to students of junior and senior high schools in the Tri-State area.

The Dravo awards of $25 each will be awarded to the creators of projects to be judged on five

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For further information write to *Dravo Corp., Neville Island, Pittsburgh 25, Pa.*

♦ Twenty high school graduates a semester are now eligible for college scholarships according to an announcement made by the Armour Research Foundation of Illinois Institute of Technology.

Ten of these will be eligible in metallurgical engineering and another ten in mechanical engineering.

The Foundation will pay the student's tuition for a degree at Illinois Institute of Technology, and a $90 monthly stipend 12 months a year to start with.

He will be employed in the Foundation's laboratories to work with some of the world's leading engineers and scientists.

Two of the co-operative scholarships, offered for the first time in the February, 1953, semester, are being set aside for Chicago high school graduates who have been active in Junior Achievement.

For further information write to Assistant Director for Personnel, *Armour Research Foundation, Technology Center, Chicago 16, Ill.*

♦ Eight boys who showed unusual skill in the design and construction of model cars were awarded grand national awards of university scholarships in the annual competition of the Fisher Body Craftsman's Guild.

The winners were:

Junior Division

1st award — $4,000, Gerald Grabcheski, Elizabeth, N. J.

2nd award — $3,000, William A. Keyser, Jr., Perrysville, Pa.

3rd award — $2,000, William Endow, Hood River, Ore.

4th award — $1,000, Robert C. Relyea, Delmar, N. Y.

Senior Division

1st award — $4,000, William D. Morgan, New Albany, Ind.

2nd award — $3,000, Clare N. Mahannah, St. Paul, Minn.

3rd award — $2,000, Charles J. Burton, Arkansas City, Kans.

4th award — $1,000, James R. Powers, Lubbock, Tex.

Almost every section of the country was represented among the scholarship winners.

New Publications

Ceramics for the Potter

By Ruth M. Home. Cloth, 229 pp., 6⅛ by 9¼ in., illus., $4.50. Chas. A. Bennett Co. Inc., Peoria 3, Ill.

This book is an informative book for beginning or advanced potters, for collectors of pottery, and for those who are generally interested in the art.

It contains a great deal of practical, precise information necessary to his craft — tables of percentages and compositions, formulas, and diagrams showing the effects of varying constituents and temperatures.

It also delves into the chemistry of the art and its geology. It also gives information about states where potter's clay may be found, and what kinds of clay may be found where, with special reference to North America. It also fur-

(Continued on next page)

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Chicago 37, Illinois

NEW PUBLICATIONS

(Continued from previous page)

nishes sufficient background for the full enjoyment of the art.

The book contains a very extensive bibliography.

Plastering Skill and Practice

By Felicien Van Den Branden and Mark Knowles. Cloth, 298 pp., 5⅜ by 8½ in., illus., $4.90. American Technical Society, Chicago, Ill.

A textbook for apprentices. It is freely illustrated with line cuts and half tones. The descriptions are expressed in clear and understandable terms.

There are 11 chapters. Each of these starts out with a number of questions, the answers of which may be found within that particular chapter. At the end of the chapter is a group of review questions, which, if properly used, will assist the student in gaining mastery of the subject matter.

The 11 chapters acquaint the student with the tools and basic materials used by the plasterer, how plaster mortar is mixed, how lathing and plaster bases are used, and how plaster is applied. Then the various types of plaster coats, such as scratch, brown, and finishing coats are described with their uses and methods of application.

Stucco and acoustic tile and plaster also is described.

Precision Measurement in the Metal Working Industry

Cloth, 365 pp., 7 by 10½ in., illus., $6.50. Prepared by the Department of Education of International Business Machines Corporation. Syracuse University Press, Syracuse, N. Y.

This book describes the instruments that make possible the interchangeability and uniform accuracy required in this technological age to produce automobiles, automatic machines, accounting machines, and the like.

It is well illustrated and shows how to use the gauges, micrometers and verniers, gauge blocks, comparators, hardness testers, and the like, which the student entering an industrial shop must not only understand but use.

Surveying as Practiced by Civil Engineers and Surveyors

By John Whitelaw and revised by S. W. Perrott. Cloth, 566 pp., 5⅞ by 8⅝ in., illus., $6. Anglobooks, 475 Fifth Ave., New York 17, N. Y.

This book, published in Great Britain, is the ninth revised edition. It is both a text for students and beginners, and a handbook for those who are actively engaged in following the advanced practices of the surveyor's calling.

The book discusses measuring with the chain, surveying with angular instruments, leveling, adjusting surveying instruments, highway and railroad surveying, stadia surveying, laying out and aligning tunnels, surveying for water supply works, marine and astronomical work, surveys in dense forests and unmapped open country, geodetic surveys, and transition curves.

Directory of Secondary Day Schools, 1951–52

By Mabel C. Rice, Research and Statistical Standards Section, Office of Education. 169 pp., $1, 1952. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Since the school year 1912–13, ten directories of accredited secondary schools have been issued by the Office of Education. Beginning with the school year 1945–46, a new series was started, designed to include *all* known high schools, both accredited and unaccredited. This volume is the second in the new series.

In this Directory, the listing of public secondary day schools is, so far as we know complete; the listing of nonpublic secondary day schools is not quite complete, but all *accredited* nonpublic day high schools are included. A new feature in this Directory, rendered desirable by the increased number of United States citizens and families in foreign countries, is the inclusion of all secondary schools abroad which are accredited by a regional accrediting association in the United States.

Information given for the various schools includes: type of organization of school; race served; number of years in school; accredited status of school on the state and regional levels; total professional staff; and total enrollment — all for 1951–52; and number of graduates for 1950–51.

Further issues of the Directory, which should be of service to a wide variety of users, are planned at intervals of about five or six years.

Education in Turkey

By Abul H. K. Sassani. Office of Education Bulletin 1952, No. 10. 96 pp., 30 cents. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Education in Turkey furnishes U. S. college registrars and other school officials who deal with student transfers with needed data on elementary, secondary, and higher education institutions in Turkey.

It describes the role of education in the development of the new republic. This bulletin is one of a series on education in other countries, of great value to the student in comparative education.

Dictionary of Architecture

By Henry H. Saylor. Cloth, 221 pp. 4⅛ by 6¾ in., $4.50. John Wiley & Sons, Inc., New York, N. Y.

An excellent aid to the student of architecture, who, in his reading will find that the books of architecture contain many words and names that have been borrowed from numerous foreign lands and languages.

For the sake of simplicity diacritical symbols have been omitted, but foreign terms are accompanied by pronunciation aids phonetically spelled.

Sixteen plates of fine line drawings have been appended to the book.

National Directory — Iota Lambda Sigma Fraternity

Cloth, 219 pp., 6⅛ by 9⅛ in. Published by the Grand Chapter of I.L.S. Fraternity; Secretary-Treasurer, Clyde H. Wilson, professor and head of department of industrial education, University of Tennessee, Knoxville, Tenn.

This book not only is a directory of members of this professional fraternity in industrial education, but contains also a full history of the founding chapter, the Grand chapter, and of the individual chapters.

Vocational Training Directory of the United States

Paper, 138 pp., 5½ by 8½ in., $2.25. Compiled by Nathan M. Cohen, Staff Member, District of Columbia Public Library, 1434 Harvard St., N.W., Washington 9, D. C.

A compilation of approximately 3900 private, nondegree, semiprofessional, technical, and trade schools offering about 150 courses.

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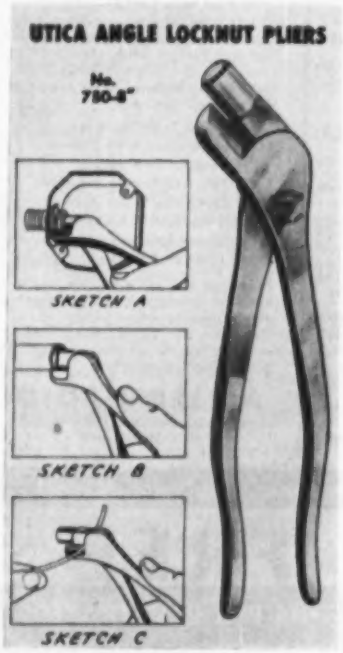
SHOP EQUIPMENT NEWS

NEW UTICA ANGLE LOCKNUT PLIERS FOR ELECTRICIANS

A new Utica Angle Locknut Pliers No. 750-8-in. does three special jobs for electricians. It tightens locknuts in outlet boxes; it removes burrs from steel tube or conduit; it cuts and skins rubber covered wire.



Utica Angle Locknut Pliers No. 750-8in.

The new pliers feature a roller jaw which rotates freely inside the standard outlet box locknut. The other jaw catches and turns the lug of the locknut; see sketch *A*. The result is tighter locknuts and bushings and a permanently grounded system.

Burrs on pipe are removed by twisting pipe between the roller jaw and the fixed jaw, as shown in sketch *B*. The fixed jaw has two cutting edges which scrape off the excess metal.

The new Angle Locknut Pliers also cut wire with the base of the jaw; see sketch *C*. They are additionally adapted to skinning rubber insulations between the roller and fixed jaws without damaging the wire itself.

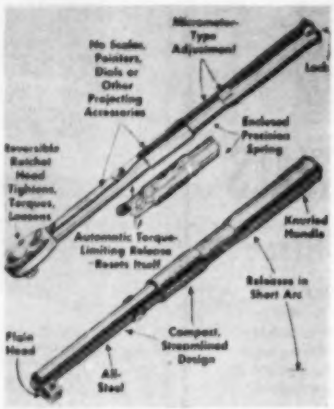
For further information write to *Utica Drop Forge & Tool Corp., Utica 4, N. Y.*

For brief reference use IAVE — 0301.

PROTO TORQUE-LIMITING WRENCH

A Proto precision torque-limiting wrench without the usual external indicating devices has been announced by the Plomb Tool Company.

The new Proto torque wrench differs from most conventional types in four basic respects. First, it is a torque-*limiting* device which releases automatically at proper setting. Second, it employs a fully enclosed precision spring under compression as the principle torque-controlling element. Third, it uses an accurate micrometer-type adjustment. Fourth, models with a built-in reversible ratchet head are available that do the work of both a ratchet and torque wrench.



Proto Torque-Limiting Wrench. Ratchet head and plain head models of the Proto torque-limiting wrench

The desired torque is set by turning the handle, just like a micrometer. When the right torque is reached by pulling the handle, the wrench releases automatically and signals the operator with a positive reflex action. Upon removal of hand pressure, the torque resets automatically for the next operation.

Six models are currently available, three with ratchet head and three with plain head. Capacities are 5–75 or 10–150 ft.-lbs. Drive sizes are ⅜ and ½ in.

For further information write to *Plomb Tool Co., 2204X Santa Fe Ave., Los Angeles 54, Calif.*

For brief reference use IAVE — 0302.

STANLEY'S "REGISTERED" RULE

As part of their centennial celebration, Stanley Tools is offering an exclusive registration on their multi-feature X226 Four Way Extension Green End Rule. When registered at time of purchase, the rule will be replaced free of charge if rule breaks in normal usage within three months. Certificate of Registration, as illustrated, is found on the inside of a distinctive wrapper. Exterior of wrapper also describes uses and features of rule. This Stanley rule has many unusual features such as square ends and even inch sticks for easy scribing, and a removable brass slide graduated on both sides which permits *direct reading* of inside measurements and small hole depths.

Stanley Rule Registration blank

Square ends and even measurements at the end of each stick on this rule allows the X226 to be used as a marking gauge in *even* measurements — 2, 4, 6, 8, 10, 12 in., etc., right to the end of the rule, and as end-to-end even measuring sticks — 6 in., 1 ft., 1½ ft., 2 ft., a yardstick, etc., for common round-the-house measurements.

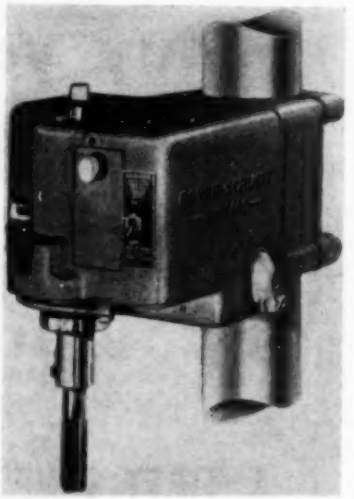
The time-proved big black numbers on plastic-protected white sticks that remain clear and legible complete this valuable measuring instrument. Address inquiries to E. C. Benfield, *Stanley Tools, New Britain, Conn.*

For brief reference use IAVE — 0303.

NEW BOYAR-SCHULTZ LEAD-SCREW TAPPING HEAD

This new Tapping Head changes your ordinary drill press into a precision tapping instrument in a matter of minutes.

No special skill is required for operation. Anyone familiar with a drill press can consistently produce even class 4 threads accurately. Foot control switch leaves hands free for loading work. Built-in reversing switch actuates drill press motor, eliminating the need for any intermediate reversing device.



Lead-Screw Tapping Head

Long trouble-free life of bronze nut and ground lead screw is assured because of their generous 1¼-in. diameters. Extreme accuracy in control of tapped hole depth is made possible by electrically controlled switches.

All taps up to ⅞-in. diameter are usable with standard adapter bushings. For taps from $1\frac{5}{16}$ in. to 2 in., adapters are available on special order.

For further information, write to *Boyar-Schultz Corp., 2110 W. Walnut St., Chicago 12, Ill.*

For brief reference use IAVE — 0304.

NEW FLUORESCENT CHALKS

The American Crayon Company announces the new fluorescent chalks in the form of Excello Squares, as aids to teachers and lecturers for chalk talks, class demonstrations, and numerous other purposes.

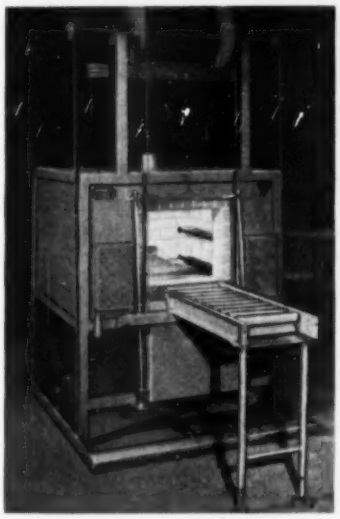
These new chalks, called Hi-Glo, come in 1 by 1 by 3-in. sticks. They are available in five brilliant colors — flare red, flash orange, brilliant yellow, green, and violet. These colors may be activated by black or blue light, adding a new dimension to vivid color effects.

The new chalk now belongs to the regular line of Old Faithful products manufactured by *The American Crayon Co., Sandusky, Ohio.*

For brief reference use IAVE — 0305.

NEW ELECTRIC ROLLER-HEARTH FURNACE

The Pereny Equipment Company has introduced a new electric roller-hearth furnace known as their Model RH-68. It is 42 in. wide, 48 in. deep, and 75 in. high, while the chamber size is 15 in. wide, 30 in. deep, and 15 in. high. The furnace is provided with a roller conveyor 36 in. long and 15 in. wide at a working height of 30 in. The door is of the counterbalance drop type equipped with a roller mounted on the top edge, thus providing a continuous conveyor.



Electric Roller-Hearth Furnace

This new unit is designed for operating temperatures of 1400 to 1500 deg. F. Current characteristics are 20 *kw*, 220 volts, 60 cycle, 1 phase.

For further information address *Pereny Equipment Co., 893 Chambers Road, Columbus 12, Ohio.*

For brief reference use IAVE — 0306.

KALAMAZOO METAL CUTTING SAW

The 1220 Kalamazoo metal-cutting band saw is the latest addition to the line manufactured by the Kalamazoo Tank and Silo Company. It provides fast, accurate production cutting of metals up to 12 by 20 in. flat, 12 in. and over round. It is available in standard or coolant-equipped models.

It possesses rugged construction to maintain precision. There are four cutting speeds (61 to 259 f.p.m.); a dash-pot mechanism to insure controlled, constant pressure during cut; swivel leaf type 45-deg. vise for easier adjustment of cutting angles; quick, easy blade mounting from the top; and an unobstructed view of cutting operation.

Standard equipment includes 1 h.p. 220/440/-60/3 motor and stock stop bar. Dimensions — 87 in. long, 26 in. wide, 25½ in. height to bed.

Literature available from *Kalamazoo Tank and Silo Co., 500–508 Harrison St., Kalamazoo, Mich.*

For brief reference use IAVE — 0307.

UNIQUE SPACING OF SCHOOL LIGHTING EQUIPMENT

Students now see better at the Love School at Jamestown, N. Y., as a result of a recent fluorescent relighting program planned by the engineer for the Jamestown board of education in conjunction with Sylvania Lighting engineers.

The installation makes use of an unusual spacing in order that maximum light from windows may be utilized and still maintain 30 foot-candles of light on desk surfaces. One row of fixtures is 7½ feet from the window wall, and the second

(Continued on next page)

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Finest quality and the best colors in all new, flat, paper-masked Plexiglas and Lucite. Sizes 6" x 12" and larger in the assortment.

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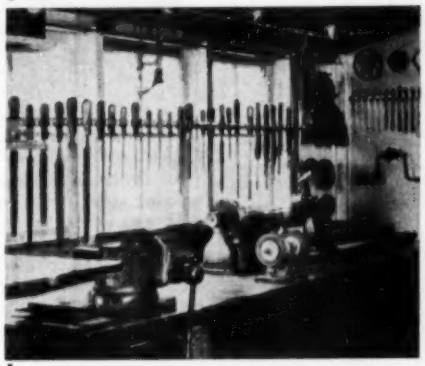

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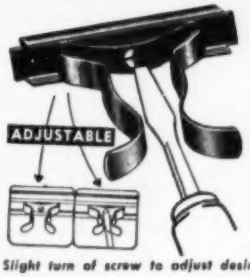

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Plans and instructions for building 27 varieties of cabinets for improving the appearance of the home of today. In addition, 10 styles of bookcases and 31 useful and decorative wall shelves. Over 630 photographs, drawings and sketches reveal every construction detail. Step-by-step instructions for 77 up-to-date home projects.

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How To Operate Your POWER TOOLS

Covers every kind of modern home workshop power tool including paint sprayers. Over 700 illustrations show how to set up machines for every operation; safety methods; latest woodworking techniques; every trick the experts use to speed up work and get better results. Also 100 homemade attachments for expanding your machines.

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How to sell, where to sell your workshop output. Includes plans for 50 easy-to-make, market-tested projects.

$2.95

How To Build MODERN KITCHEN CABINETS

This book supplies all the help you need for building up-to-date kitchen cabinets. It explains how to build a single unit or any combination of units. There are floor and wall models to fit every layout. Complete drawings, instructions and lumber cutting lists are included. Tells how to plan the remodeling work, how to build and install the cabinets.

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Selected WOOD TURNING PROJECTS

Most complete book of useful lathe projects. Over 70 things you can make — and will want to add to your home. Popular woodenware for the table; bowls, trays, servers, elegant stands and tables, bed, chair, floor lamps and table lamps, decorative boxes, many others. Includes 30 classical and period turning profiles you can copy. Also explains hundreds of special methods and tricks of the trade. Lathe finishing.

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SHOP EQUIPMENT NEWS

(Continued from previous page)

row is 3½ feet from the inside wall. Eleven feet separate the rows.

Fixtures are Sylvania Trimline (type CL-242, bipin instant start), suspended by 15-inch pendants in two rows of 7 fixtures each. They are equipped with Warmtone lamps and consume 1400 watts per room.

For illustrated folder describing Sylvania Fluorescent Fixtures for Schools, write to *Sylvania Electric Products, Inc., Dept. L-1202, 1740 Broadway, New York 19, N. Y.*

For brief reference use IAVE — 0308.

NEW ELECTRIC CHAIN SAW

A new electric chain saw with enough power and speed to handle the toughest wood cutting jobs has been announced by the Porter-Cable Machine Company. Model 110 is a one-man saw suitable for topping, notching, and felling large trees, for limbing, flush-cutting, or under-cutting

Porter Cable's New Electric Chain Saw

main branches, and for bucking logs and heavy lumber.

An exclusive feature of this saw is the log-gripping teeth which hold the saw against the work and enable the machine to spike and feed itself, thereby eliminating the need to push the saw into the wood. Six of these spiking teeth are located on each side of the cutter bar to prevent the saw from pulling to right or left, or from jumping out of the cut.

The Porter-Cable saw weighs only 18 lb. It is 29½ in. long, 6½ in. wide, and 9½ in. high. The 14-in. cutter bar can easily fell trees up to 28 in. in diameter.

The saw requires a Universal a.c.-d.c. 115-volt, 10-amp. motor. A special 230-volt motor also can be ordered. Two portable electric generators driven by gasoline motors are available as optional equipment to provide an independent source of power in remote locations. The saw comes equipped with a 50-foot extension cord.

For complete literature write *Porter-Cable Machine Co., 12 Exchange St., Syracuse 8, N. Y.*

For brief reference use IAVE — 0309.

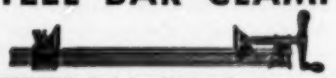
NATIONAL FORGE ORDNANCE COMPANY IMPACT TESTER

A new three-capacity-range Impact Tester especially designed for testing plastics, ceramics, and

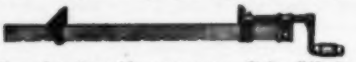
(Continued on next page)

SPECIFY AND INSIST UPON GENUINE "Jorgensen" TRADE MARK REG U S PAT OFF

STEEL BAR CLAMPS



"JORGENSEN" Steel Bar Clamps offer many exclusive desirable features. The "multiple disc clutch" holds securely, releases easily without notches or other deformity in the bar. Fast operating and economical — repairs easily made if ever necessary. Built to industrial standards, they will serve you best in the school shop. Style #70 "JORGENSEN" I-bar Clamps are a favorite — many other Styles are available.



Still a favorite with some users, Style #61 is a "notched bar" type steel bar clamp. Somewhat slower in operation than our "fast-operating" bar clamps, but just as carefully designed. Will provide long, satisfactory service.

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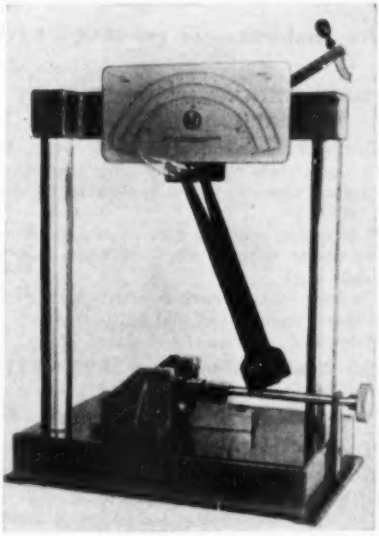


Impact Tester

Additional information may be had by writing H. L. MacBride, *National Forge and Ordnance Co., Testing Machine Division, Irvine, Warren County, Pa.*

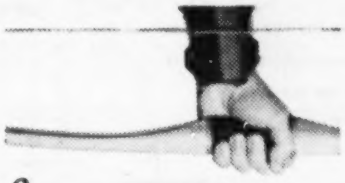
For brief reference use IAVE – 0310.

TOLERTON DRAWING TABLE

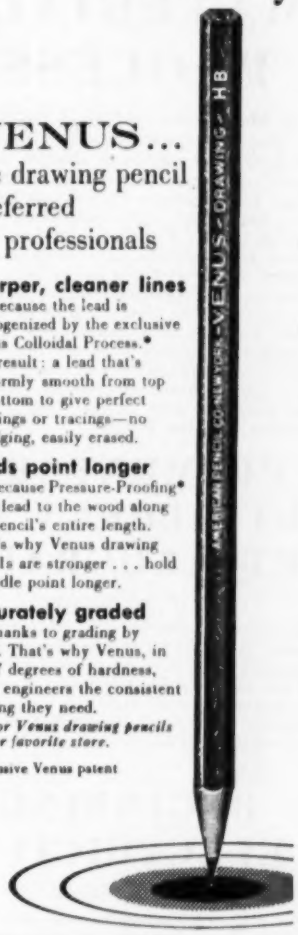
The Tolerton Company, manufacturers of industrial-arts equipment, has developed a new

(Continued on next page)

New Tolerton Drawing Table



for greater accuracy



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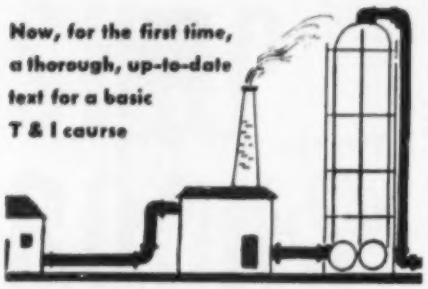

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Designed by experienced teachers for the course in materials engineering at the vocational level, this book fills the long felt need for a text on the origins, properties, processing, and uses of the basic raw materials. Wood, fuels, ceramics, iron, steels, the nonferrous metals, and plastics are all covered. Organized in teachable units, each basic material is traced from its source to its uses. Each unit includes simple-to-do student activities and many drawings and photographs to demonstrate the scientific principles and processes involved in converting raw materials into essential products for industry and the home. $3.48

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SHOP EQUIPMENT NEWS

(Continued from previous page)

drawing table for school use. The table, known as Tolco Model TWD, is made of choice flat grain hardwood and is sturdily constructed.

It has an adjustable, hard maple laminated top built by the electronic gluing process. A cabinet with compartments 2 by 31¾ in. provides storage space for individual drawing boards. A drawer 5 by 21½ in. is provided for drawing materials.

Over-all dimensions of the new unit are length 42 in., width 31 in., and height 39 in. For additional information and prices write the *Tolerton Company, 265 Freedom Avenue, Alliance, Ohio.*

For brief reference use IAVE — 0311.

SIXTH EDITION OF THE STARRETT MACHINISTS' BOOK

This well-known little handbook which has been a great help to apprentice and journeymen machinists since 1941 now appears in its sixth edition.

In its revised edition it is up to date and covers many of the things a machinist must know in his daily work.

The book contains much informational material and many useful tables and illustrations.

Write to *L. S. Starrett Co., Athol, Mass.*

For brief reference use IAVE — 0312.

THE NEW CROWN LEATHER COMPANY CATALOG

This new catalog presents the materials and tools needed by the leather worker.

The descriptive matter on leather is concise but good. Quite a number of make it yourself kits and moccasin kits are listed.

Leather craft tools, buckles, bag and briefcase locks, ornaments, rings, snap fasteners, decorative spots and initials, zippers, and cements and enamels also are shown.

A price list is included with each catalog.

For further information write to *Crown Leather Co., 22 Spruce St., New York 38, N. Y.*

For brief reference use IAVE — 0313.

NEW CINCINNATI LATHE AND TOOL COMPANY CATALOG

The new Catalog D-108, published by the Cincinnati Lathe and Tool Company, presents the C-O Cincinnati 16-in. 3000 sliding head drill, which is the redesigned Canedy-Otto Mfg. Co. 3000 FV-Box Column Floor Drill acquired in 1949.

Write for a copy of this new catalog, D-108, by addressing *Cincinnati Lathe & Tool Co., Oakley, Cincinnati 9, Ohio.*

For brief reference use IAVE — 0314.

NEW RIVETT GRINDER CATALOG

Rivett Lathe & Grinder, Inc., Boston, Mass., has published a new catalog illustrating and describing its new Model 84 Small Hole Grinder. This machine also can be converted to external grinding. This flexibility of operation is keynoted in the description of interchanegeable wheelheads for internal and external grinding. Likewise highlighted are the lathe-type spindle for direct mounting of draw-in collets and step chucks, the swiveling of the workhead or the table for taper

(Continued on page 98A)

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This directory is published as a convenient guide to sources of supply, covering the products of manufacturers carrying product information in this ANNUAL NUMBER. For alphabetical index of manufacturers' advertising see page 106A. To obtain products not included in this directory, quotations or additional information to help you make up your specifications, lists of equipment, etc., address Industrial-Arts Service Division, or use coupon on page 107A.

A

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General Electric Co.
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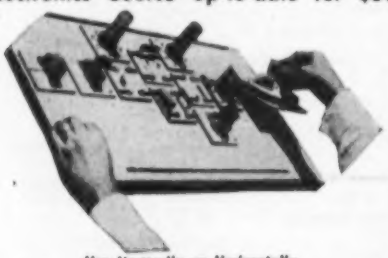

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SHOP EQUIPMENT NEWS

(Continued from page 96A)

grinding, the lever chuck closer for quick operation of collets.

For copies of the new Catalog 84A, write to *Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.*, mentioning this magazine.

For brief reference use IAVE — 0315.

ARTHUR J. McMURRAY APPOINTED POWER SHOP SALES MANAGER

DeWalt, Inc., subsidiary of American Machine & Foundry Co., and makers of a line of radial arm power cutting machinery for the wood- and metalworking industries and of the more recent "Power Shop" for home woodworkers, announces the appointment of Arthur J. McMurray to the position of Power Shop Sales Manager.

He started with the DeWalt firm in 1936 and since that time has held the following jobs: DeWalt dealer in Kansas City, District Manager in Kansas City, and Regional Manager in the Des Moines area.

CHICAGO FIRM OPENS EASTERN OPERATION

Eastern customers of the Frederick Post Company will be served with greater speed through a new manufacturing plant and warehouse opened at Englewood, N. J.

The new plant will service the area including all of New England, New York, and Eastern Pennsylvania.

The Frederick Post Company is one of the largest producers of drafting materials for reproducing engineering drawings.

The firm manufactures a complete line of drafting materials in Chicago, Ill., and Owens, Wis.

NEW BRANCH OFFICE IN LOS ANGELES METROPOLITAN AREA

For the convenience of customers in the Los Angeles Metropolitan area, The Boyar-Schultz Corp., 2110 Walnut St., Chicago 12, Ill., announces the opening of their new office carrying a complete stock of Boyar-Schultz surface grinders, profile grinders, screw machine tools, copper head laps, and T-slot bolts. Harry W. Schlentz is the branch office manager and the address is 2462 E. Slauson Ave., Huntington Park, Calif.

NIAGARA'S BULLETIN 87-A

A new four-page illustrated Bulletin, 87-A, deals with construction, new features, specifications, and operation. Write *Niagara Machine and Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.*

APPOINT NEW SALES REPRESENTATIVES

The Robert Murphy's Sons Company, Ayer, Mass., manufacturers of "Stay Sharp" industrial and domestic knives, has appointed four new representatives. The firm names and territories covered are: C. G. Gregory & Associates, Houston, Tex. — Louisiana, Texas, and Oklahoma; James B. Schooler Company, Kansas City, Mo. — Kansas and Western Missouri; Kenneth B. Komp Sales Company, San Mateo, Calif. — Oregon and Washington; Herbert O. Jones, Chicago, Ill., will cover Illinois, Wisconsin, Iowa, Detroit, Mich., and South Bend, Ind.

(Continued on page 100A)

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H

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Dixon, Inc., Wm.
Duro Metal Products Co.
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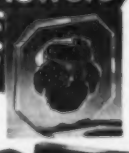

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SHOP EQUIPMENT NEWS

(Continued from page 98A)

VERNON R. ANDERSON APPOINTED MANAGER

A. B. Dick Company, announced the appointment of Vernon R. Anderson as manager, special promotions in the advertising and sales promotion department.

In his new position, Mr. Anderson will be primarily concerned with the promotion of the new A. B. Dick spirit and lithograph products in addition to the well-known line of A. B. Dick mimeograph products.

HANDBOOK OF "MODELING WITH PERMOPLAST AND AMACO CRAFT CLAYS"

The American Art Clay Company has just released its new handbook of modeling which is just off the press and a little circular concerning the new booklet.

This handbook of "Modeling With Permoplast and Amaco Craft Clays" deals with hand methods so simply that anyone can enjoy working with clay and achieve satisfactory results.

Copies are available at 25 cents each postpaid. Write to the *American Art Clay Co., 4717 West 16th St., Indianapolis 24, Ind.*

For brief reference use IAVE — 0316.

PUBLICATION ON SELF-LEVELLING UNIVERSAL CLAMPS

The DoAll Company announces publication of a folder describing its Universal Self-Levelling Clamps which are adaptable to any kind of work holding problem. They facilitate the holding of irregularly shaped pieces over a wide range of

(Continued on page 102A)

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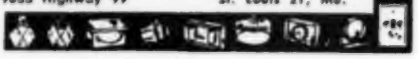

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Duro Metal Products Corp.
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Dixon, Inc., Wm.
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Lufkin Rule Co.
Millers Falls Co.
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Lufkin Rule Co.
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X-acto Crescent Products Co., Inc.

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Brodhead-Garrett Co.
DeWalt Products Corp.
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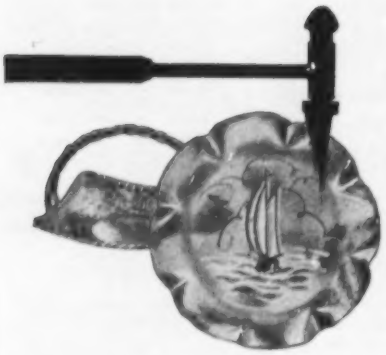

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SHOP EQUIPMENT NEWS

(Continued from page 100A)

sizes without necessitating the use of shims, pads, or step-blocks. The range of application of these clamps on various machine tools is illustrated and discussed in detail. Complete ordering information is given on the back page of the folder for the various models. Ordering information is also given for T-slot bolts for mounting the clamps to certain machine tables.

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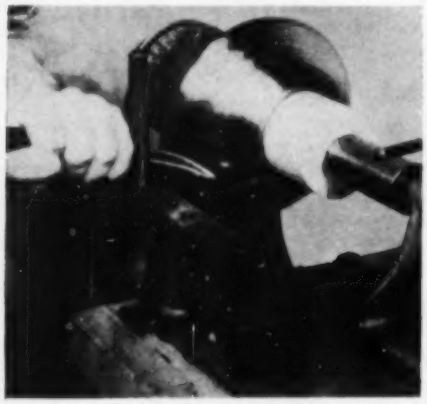
Low tooling costs and conservation of expensive metals are required by many of the key defense items, particularly those where the part



A metal-spinning aid

is open only at the small end, or where a reverse or beading is required on the edge. The size of the product is of no consequence when spinning.

The book will be sent free to department heads in industry or school instructors who address their request to *Boice-Crane Company, 932 Central Avenue, Toledo 6, Ohio.*

SOUTH BEND CATALOG

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(Continued on page 104A)

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RADIO TEST EQUIPMENT
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Weston Electric Instrument Co.

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Hammett Co., J. L.
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Weston Electric Instrument Co.

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Shopmaster, Inc.
Stanley Electric Tools

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DeWalt Products Corp.
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Dumore Co., The
Duro Metal Products Co.
Stanley Electric Tools
Yates-American Machine Co.

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Dietzgen Co., Eugene
Lufkin Rule Co.
Stanley Tools
Weber Company, F.

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Starrett Co., L. S .

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Boice Crane Company
Brodhead-Garrett Co.
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Duro Metal Products Co.
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Duro Metal Products Corp.
Oliver Machinery Co.
Shopmaster, Inc.
Snap-On Tools, Inc.
Walker-Turner Co., Inc.
Yates-American Machine Co.

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Shopmaster, Inc.
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Brodhead-Garrett Co.
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New York University School of Educ.
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University of Minnesota
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Duro Metal Products Corp.

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Stanley Electric Tool Co.

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Brodhead-Garrett Co.
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Oliver Machinery Co.
Stanley Electric Tools
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Stanley Electric Tool Div.

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SHOP EQUIPMENT NEWS

(Continued from page 102A)

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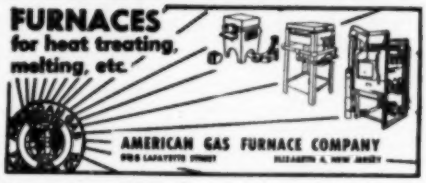

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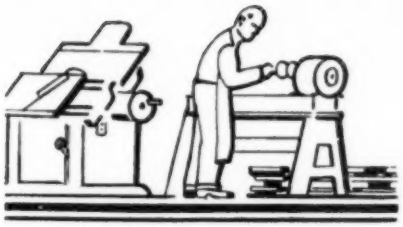

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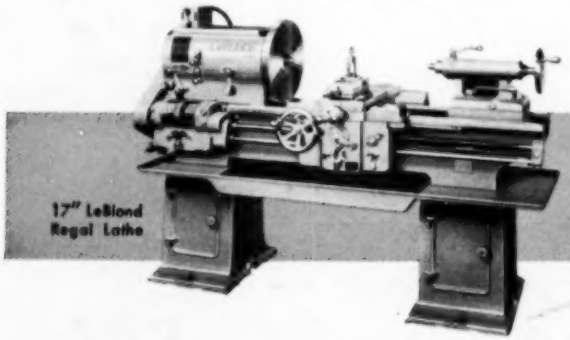

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